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Original Articles

Some Thoughts on the Prognosis and Curability of Syphilis

BY JAY FRANK SCHAMBERG, M.D.

Professor of Dermatology and Syphilology in the Graduate School of Medicine of the University of Pennsylvania, Philadelphia.

Syphilis is essentially a disease of paradoxes. Any generalization made with respect to it is subject to numerous exceptions. It may be a death-dealing or permanently invaliding malady, or on the other hand it may run a very mild course.

All infectious diseases represent a reaction between the invading parasite and the defensive activities of the host. The character and virulence of the infecting strain unquestionably influence the severity of the attack. This is notably true of acute infectious processes—the exanthemata, for instance. There are mild and severe epidemics of these diseases which run fairly true to type. In chronic infectious diseases such as tuberculosis, syphilis, leprosy, etc., it would appear that the severity of the disease is less proportionate to the virulence or the attenuation of the causative microörganisms than to variations in the character of the defensive powers of the individual.

To be sure the parasite influences the host, but it is no less true that the converse of this process takes place. It would be difficult to conceive that there were not evolutionary changes in the life of parasites.

Syphilis which has existed for many generations in circumscribed communities becomes mild, but when transplanted to a new and virgin soil acquires malignancy. This was illustrated by the extremely mild type of syphilis which prevailed for many years on the Island of Hispaniola, now Haiti, and the severe type which developed in Europe when carried there by the sailors of Columbus's crew.

THE NEWER PATHOLOGY OF SYPHILIS.

The notable and epoch-making studies of Warthin ("The New Pathology of Syphilis," *Jour. of Syph.*, 1918, page 425), based upon painstaking gross and microscopic examination of organs and tissues, led him to the statement that in 300 routine autopsies out of 750, definite evidence of syphilis was found. He adds: "The viscera are involved in all stages of latent syphilis, not by gummatous processes but by specific inflammatory processes, eventually fibrosis, usually mild in character, but acquiring pathologic importance because of their progressive character." This is the first definite light which has been thrown upon the pathology of asymptomatic cases still harboring treponemata in the tissues. Had Warthin been able to give us the detailed clinical histories of these cases with serologic reports the records would have been invaluable in shedding a greatly needed illumination upon the prognosis of latent syphilis and upon the question of the curability of the disease. He states that in many of the cases syphilis had never been suspected or treated, but that in some cases there was a negative Wassermann reaction. The relationship of the Wassermann test to this discussion will be later adverted to.

Warthin makes the following significant statement: "As to curability, I have never seen pathologically a cured case of syphilis." I have no doubt that Warthin's statement is in perfect harmony with his findings, but this constitutes no valid argument against the curability of the disease, for one would expect few if any cures among the cases represented by the material studied by him. In the first place, as I interpret his descriptions, the necropsy material consisted of routine hospital cases, including instances of severe congenital syphilis, undiagnosed adult cases, and a large number of middle-aged known cases of syphilis. There is no evidence that a single case received adequate treatment according to our present-day views. It is not likely that many were treated by the newer medicaments, or if they were so, then it would only have been during the later periods of the disease. No cases were, of course, included of primary syphilis treated with the organic arsenicals, the most favorable time and method to insure cure.

There are some writers who are inclined to minimize the importance of Warthin's work and who say that it has not been confirmed. It will take a long time before any one will have the assiduity to repeat the laborious and painstaking efforts of Warthin. The researches of the Ann Arbor scientist fit in with our clinical knowledge of syphilis. In the great run of cases syphilis becomes asymptomatic, and with treatment, or sometimes without, it gradually becomes a mild disease and does not to any material degree seem to inconvenience the patient. He believes he is cured because he presents no symptoms, and he no longer seeks the services of the physician. How commonly do we see patients with positive Wassermann reactions who have been inadequately treated, and yet who feel perfectly well and who exhibit no discoverable evidence of the disease. These are the patients who on autopsy would show the mild but progressive inflammatory changes in the heart muscle, adrenals, liver, kidneys, and other organs described by Warthin. Their expectancy of life is apt to be shorter than the average. In some cases they live for twenty, thirty or forty years after infection, and die of visceral affections that are never attributed to the antecedent luetic infection.

It is astounding at times, even in untreated cases, how mild a course syphilis may run. The tissues become adapted to the parasite, and the latter acquires almost but not quite the innocuousness of a saprophyte. Indeed, Warthin believes that syphilis in the great majority of cases tends to become an infection not much more active or injurious than the streptococci found in the mouth. He adds: "The very slight lesions found in so many cases prove this point beyond doubt." After all, he reflects, the intratissue spirochetes should in cases without eruption and with a negative Wassermann perhaps be regarded in the same light as that in which we look upon the mouth streptococci. But when the spirochetes are present in the tissues they are not entirely harmless, for they may bring about slight but insidious and progressive structural changes. This is sound doctrine based upon sound pathological study.

The above opinions were based in large part on a study of inadequately treated cases, cases treated during the prearsphenamine period, and undiagnosed and therefore untreated cases.

It also includes some cases with negative Wassermann reactions, and these are significant, but the evidential value of a negative test depends upon its sensitivity.

It would take a quarter of a century or more for a parallel study of necropsy material representing cases that had been subjected to our present-day methods of treatment.

CURABILITY OF SYPHILIS.

Criticism of the asserted cure of syphilis may be made upon the grounds that the burden of proof is upon him who asserts it, and that definitive cure is difficult to demonstrate. This must be frankly admitted.

Cure would mean the disappearance of all symptoms for all time and the extermination of the parasitic cause of the disease. In an individual case this could only be determined by watching the patient through-

out his natural life, and then be corroborated by a careful microscopic examination of the organs and tissues after death.

There is much evidence to believe that many cases of syphilis treated at the present day are cured. The most convincing evidence of this is not merely the disappearance of all symptoms and the development of a persistently negative Wassermann reaction by new and delicate tests, but the increasing reports of complete and thoroughly substantiated reinfections with a reduplication of all symptoms. It is held by some writers that reinfection is no convincing evidence of cure. My reply would be that there is less warrant for negation of cure than for affirmation, particularly in the light of clinical experience and laboratory experiment. It is the general experience of syphilologists that genuine reinfections are much more common since the institution of the newer and more effective methods of treatment.

If there is a direct relationship between more effective treatment and increased reinfections, the deduction must be that the more nearly the infection is eradicated the greater is the liability to complete susceptibility to reinfection. According to Warthin, the spirochete carrier is immune to new infection only so long as he carries spirochetes. As far as is known syphilis does not, like the acute infectious diseases, produce protective antibodies which persist after cure.

Inoculation experiments upon cases of acute syphilis have shown that there is a definite resistance to a new generalized infection. Even in late syphilis inoculation produces merely local lesions.

Neisser has said that direct inoculation with syphilitic virus is the best index of cure or persistence of the disease. He found in his experiments on apes that immunity existed only while the animal harbored living treponemata. *Susceptibility to reinfection followed cure by specific remedial agents.*

This constitutes strong evidence that genuine reinfections connote previous cure, and if this is true then we may state that syphilis is a curable disease.

There are many cases of syphilis in which complete and definite eradication of all spirochetes has probably not taken place, but in whom the disease appears to be arrested. This is true even in cases of syphilis of the central nervous system. I know of a man who has had tabes dorsalis for over fifty years and who is now over eighty years of age. No progress in symptoms has developed during the past thirty years.

I believe that we should distinguish between an anatomical cure and a clinical cure just as we do in the case of tuberculosis. There can be no doubt that many patients with tuberculosis are clinically cured. They live their natural span of life and die of some other cause. At autopsy some tubercle bacilli are found locked up somewhere in the body, but their noxious activity has ceased.

It is probable that some of our cases of syphilis are permanently arrested in the same sense as the term is applied to tuberculosis. To be sure we must ever be alive to the possibility that the spirochete is more prone to cause insidious and progressive changes, but these may in some cases be so slight and so slow as never to become clinically evident.

RELATION OF REINFECTION TO THE QUESTION OF CURABILITY.

It has been claimed by certain writers that inasmuch as reinfection is impossible in a syphilitic who has not been cured, and inasmuch as syphilis is not a curable disease, therefore reinfection does not take place in syphilis. On the other hand, the converse of this proposition has been set forth in the following terms: Reinfection is not possible in uncured syphilis; it has taken place in individuals who have suffered from syphilis, therefore reinfection is evidence of cure. The third opinion has been expressed that reinfection may take place in persons still suffering from syphilis, and, therefore, such a phenomenon is no evidence of cure. A very considerable literature has developed in the discussion of these immunologic problems.

The most convincing scientific evidence on this subject is that which was published by Professor Albert Neisser and a number

of associates, after a most exhaustive and brilliant research on syphilis in the ape species, and carried out largely in a country where these animals were freely obtained. Neisser (Beiträge zur Pathologie und Therapie der Syphilis, Berlin, 1911) states: "We have seen no syphilitic manifestations from reinoculation of apes, when these animals were still suffering from the disease." He adds: "There are rare exceptions to this statement, but whether these apparent reinoculations (with the production of a primary lesion) have followed spontaneous cures or are to be regarded as superinfections, one cannot say. The former is to be looked upon as the most plausible assumption."

The Breslau scientist held that true immunity, in the narrow sense of the word, does not exist in syphilis. There is a condition which he called "anergy," *i.e.*, a state of resistance against new infection as long as the infection remains in the body, but this anergy is nothing absolute; it is only relative, for even during the presence of the disease, superinfection with a local lesion is possible particularly in the later stages of the disease. In connection, however, with superinoculation there are difficulties of interpretation which must be considered.

It appears to me that Neisser and his colleagues have adduced extremely strong evidence of the curability of syphilis. Neisser states that *practically all of the animals that could not be reinoculated still suffered from the disease, whereas those that were cured by treatment could be immediately infected.*

When we consider these animal experiments in conjunction with the vast clinical experience which has accumulated during the course of centuries, we find that the one supports the other. Who has ever heard of a case of paresis or tabes dorsalis contracting a fresh attack of syphilis with chancre, glandular enlargement, and secondaries? Considering the tens of thousands of such cases throughout the world, the absence of such reinfections supports the experiments of Neisser—that animals which still harbor the disease cannot be genuinely reinfected. To be sure one must except reinfection or superinfections during the primary stage.

That cases of true reinfection do take place is evidenced in the present-day literature on the subject. A most striking example of such genuine reinfection came under my observation a few years ago, and although I have already published the same, it would appear to be of interest to again make mention of the case.

A man, aged twenty-three, contracted syphilis in June, 1917. During a drunken orgy he and two companions cohabited with the same woman, and all three became infected. (The other two victims were treated by us for syphilis.) The patient, with a suspected chancre of the meatus, was first seen, June 21, in the hospital of the University of Pennsylvania, by Dr. Hollingsworth Siter. July 2, a macular eruption appeared on the body. An intravenous injection of neoarsphenamine was given, and also some mercury by mouth. August 14, the patient presented himself at the University Hospital with headaches, inequality of the pupils, and exaggerated patellar reflexes. The Wassermann reaction was positive. A second dose of neoarsphenamine was administered.

The patient came under my care September 9, 1917. Three days later the Wassermann reaction with the cholesterinized antigen was ++++; with alcoholic extract of syphilitic liver +, and with acetone insoluble lipoids ++++. Between September 22 and November 15, 1917, the patient received eight intravenous injections of arsphenamine, the Wassermann reaction becoming negative after the first injection, but relapsing to a weak positive on several subsequent occasions. He was drafted into the army, and while at two southern camps, because of a deep scar on the glans penis, had a blood test taken monthly for nine months. All of these tests proved negative.

After his discharge from the army he again lived with a woman with whom he had been living before he entered the army. April 4, 1919, he appeared at my clinic at the Polyclinic Hospital with a generalized

pinkish-red roseola. This developed within a fortnight into an extensive varioliform syphilid, covering the face, trunk, and extremities. There was a large chancre on the foreskin opposite the corona, a site different from that of the first chancre. Six Wassermann tests made between April 26 and May 26 were strongly positive (++++) despite seven administrations of arsphenamine and neoarsphenamine. During this period the chancre and eruption promptly disappeared under the treatment.

To summarize, the patient contracted syphilis in June, 1917; after treatment with arsphenamine he had repeated negative Wassermann reactions until the early part of 1919, when he contracted another chancre, followed by a wide-spread and severe papulopustular syphilid, and had a strongly positive Wassermann reaction. It is obvious that this patient had been cured.

PROGNOSIS.

The prognosis of syphilis is influenced to an enormous extent by (1) the stage of the disease in which the patient presents himself for treatment; (2) the character of the presenting symptoms, particularly with reference to involvement or absence of involvement of the central nervous system; and (3) the ability or willingness of the patient to receive persistent and systematic treatment.

Stage of Disease.—The most auspicious period for the inauguration of treatment is primary syphilis with a negative Wassermann reaction. Before the treponemata have reached the blood stream in such numbers as to stimulate the formation of Wassermann reacting substances, the disease is readily cured by appropriate courses of treatment. Even after the Wassermann has become positive in primary syphilis, vigorous and adequate treatment will usually result in cure. The longer the disease has existed before the institution of treatment the more thorough and persistent must the therapeutic attack be and the less positive becomes the assurance of cure. From experience gathered in the past decade it would appear that a high percentage of properly treated cases of secondary syphilis may be cured. It is realized at the present day that quite a large percentage of cases of secondary syphilis and even of late primary syphilis exhibit pathological alterations of the spinal fluid, which indicate an invasion of the central nervous system by the treponema. Fortunately only a small percentage of these cases eventuate in degenerative changes in the brain and cord, and these are chiefly the inadequately treated cases.

In the latent and tertiary stages of syphilis the prognosis as to cure becomes much more problematic. The parasites have become entrenched in the various nooks and crannies of the body and have set up certain inflammatory cell and connective tissue barriers which often protect them against attack. This is particularly true when they are lodged in the central nervous system. It is, of course, impossible to restore degenerated or atrophied parenchymatous structure, but something can be done in certain cases to arrest such processes in their incipiency. It is quite possible in early cases of tabes dorsalis to stop the progress of the disease and to relieve such symptoms as shooting pains and crises. In some cases complete arrest or cure appears to be achieved. There is some evidence also that certain early cases of paresis may be arrested and the patients made useful and efficient citizens.

Fordyce claims, on serologic and clinical evidence, to have secured a cure in exceptional cases of paresis, and this happy achievement is likewise asserted by no less an authority than Nonne, who at a recent meeting of the German Dermatological Congress in Hamburg stated that he had cured six cases of progressive paralysis.

There must be a period in the life of the impending paretic, just prior to the development of symptoms, when appropriate treatment might be expected to accomplish more than after actual symptoms of paresis have developed. This period may at times be suspected by the character of the colloidal gold test and protein tests, although a paretic gold curve does not always connote potential paresis. The effective treatment of paresis, however, is,

like the treatment of smallpox, preventive treatment.

Cerebrospinal syphilis of the inflammatory or exudative type commonly yields to proper treatment, and a proportion of these cases may be cured.

THE WASSERMANN REACTION AND PROGNOSIS.

The presence of certain reacting substances in the blood which produce complement fixation is the most subtle evidence of syphilis. This reaction may be present in the absence of other discoverable evidence of the disease, and in treated patients it persists long after disappearance of all clinical manifestations. Its chief fallibility is in the unwarranted negatives which we commonly observe, sometimes in the face of circumscribed but evident manifestations of the disease.

The reacting substance in the blood is not specific because it reacts with non-specific antigens. It is probably a substance resulting from the action of the treponema upon cells—a substance which possesses an affinity for lipoids. If this be true it is probable that the Wassermann reaction is a measure of the activity of the spirochetic process. In secondary syphilis when the blood and tissues swarm with parasites, the complement fixing substance in the blood serum is quantitatively at its highest point. Untreated cases may continue for many years to give strongly positive reactions even though no untoward symptoms be present. In adequately treated cases the reaction gradually becomes weaker and frequently disappears. Even in some untreated cases a negative Wassermann may develop after a lapse of years. It is conceivable that spontaneous cure may in rare instances take place, and, indeed, I believe I have on one or two occasions observed such cases.[1] In these instances natural antibodies are doubtless produced which nullify the noxious influence of the treponema or lead to its death.

The negative Wassermann must not, however, be interpreted as necessarily indicating the death or extermination of all of the spirochetes.

Since the complement fixation test of Bordet and Gengou was first applied by Wassermann to syphilis, improvements have been made in the antigens and in the technique which have increased the sensitiveness of the test. A negative reaction by the older technique was not infrequently positive when the cholesterolized antigens were employed. A new test recently devised by Kolmer will discover many positives in luetic subjects whose blood serum is negative with the cholesterolized antigens. While the Kolmer technique appears to be the most sensitive and most satisfactory thus far devised, it is doubtful whether it, in all cases, is sensitive enough.

Inasmuch as one of the most important criteria of cure of syphilis is a persistently negative complement fixation reaction, the question of delicacy and sufficiency of such test becomes an important matter for discussion. The question arises, does any test at our disposal detect the minimal activity of living treponemata in the body? Time and careful observation alone will determine this point. Every advance, however, made in the direction of increasing the sensitivity of the test, without of course giving false positives, brings us nearer to the solution of the problem of the curability of syphilis.

COMMENT.

We regard syphilis as a malady which in its early stages is a blood-stream infection, but which tends to become a polyorganic infection. Strictly speaking it is more a tissue than a blood disease; it is less an external than an internal disease. The old comprehension of syphilis as a blood disease that was characterized by cutaneous lesions and open sores falls far short of a proper concept of it. Indeed, in not a few cases there are never any skin manifestations. The newer pathology which has been so greatly clarified by Warthin discloses the true nature of the disease.

[1] I recall the case of a woman, sixty-eight years of age, who presented herself at the hospital with senile keratoses on the face. One arm was extensively covered with huge scars characteristic of syphilitic cicatrices. The patient stated that she had had, when twenty-two years of age, large ulcerations on the arm which healed up after taking a liquid medicine for about a month. No further treatment was taken. The woman had one miscarriage, one feeble-minded child, and one that died of marasmus. The Wassermann test taken at the age of sixty-eight, forty-six years later, was negative.

There can be no doubt that many cases that have been considered cured in the past were not cured. On the other hand, there is scientific justification in regarding syphilis as a curable disease; there is, furthermore, much clinical evidence that many cases of syphilis are being cured by the newer and more powerful drugs at our disposal to-day. If a patient has had adequate treatment, has come under therapeutic care early in the course of the disease, is free of any clinical manifestations of the disease including cardiovascular and nerve involvement, has a negative blood and spinal-fluid Wassermann by the most delicate technique for a period of two years, he may be regarded as cured. To be sure the phrase "adequate treatment" lacks concreteness, and is indeed difficult to satisfactorily define, but syphilologists have a more or less general conception of what therapeutic adequacy means. It means in general terms twenty to thirty intravenous injections of one of the organic arsenicals during the first year of the infection, with ten during the second year, and perhaps half a dozen during the third year. Interspersed between the arsenical courses there would be 60 or 80 inunctions or injections of insoluble mercury. This should not be regarded as a crystallized therapeutic formula, but it indicates in a general way the amount and intensity of treatment, upon which may be predicated the likelihood of cure.

There are therapeutic optimists and pessimists in the profession. Some regard syphilis too lightly and treat it accordingly. Others believe in the old dictum, "once a syphilitic always a syphilitic." The truth lies, as it commonly does, in the middle-ground position. It is desirable in the interest of the psychic reactions of our patients that we bend not backwards and commit ourselves to the view of the incurability of syphilis, without adequate evidence to support this attitude. We, of course, do not desire, out of kindness of heart, to delude our patients and incidentally ourselves as to the eradicability of the syphilitic infection without sufficient scientific evidence. I believe that we are fully justified in saying to our patients: "Syphilis is a curable disease, but the cure cannot be achieved in a short period of time; success will depend upon perseverance in treatment, and to this end your coöperation is as essential as is that of your physician."

The Value of Iodides in the Treatment of Syphilis

BY LEWELLYS F. BARKER, M.D.
Professor of Clinical Medicine in the Johns Hopkins University, Baltimore, Md.
AND
THOMAS P. SPRUNT, M.D.
Baltimore, Md.

From their introduction in the first third of the nineteenth century to the advent of Ehrlich's salvarsan, the iodides were held in high esteem as most valuable, indeed indispensable, aids in the treatment of syphilis. Used first in the form of burnt sea sponges in treating venereal ulcers of the throat, pure iodine was also later tried with good results. In 1821 Biett[1] employed iodine combined with mercury in the treatment of syphilis. In 1831 Lugol[1] reported cases of tertiary luetic affections cured by preparations of iodine alone; even now, in Germany, pure iodine, dissolved in potassium iodide solution, is more frequently employed than in other countries. Williams[2] and Wallace[3] used potassium iodide in the treatment of syphilis extensively and did much to popularize this remedy in Great Britain. It was not introduced, however, without strong opposition. Wallace explained the great variety of

opinions concerning its value by the gross contamination of commercial preparations and by the very small doses employed by some practitioners. He himself gave in a mixture a daily dosage of 30 grains and assured himself by examination of the urine not only that the patient was taking the medicine but also that the preparation contained a satisfactory amount of the salt. He maintained that iodine was absorbed only in the form of its alkaline salts, and that to give it in any other form was not only unnecessary but positively harmful in view of the irritating qualities of pure iodine.

The older observers looked upon the compounds of iodine as curative agents for syphilis. It was only later realized that their effects were exerted not upon the cause of the disease but upon the inflammatory tissues produced in reaction to the syphilitic virus, and it was even still later that it became known that their use had no effect upon the Wassermann reaction. These views, coupled with the introduction of arsphenamine, led many physicians to minimize the therapeutic value of the iodides in syphilis, and some abandoned their use altogether in its routine treatment. In this paper we have attempted to sum up our knowledge of the iodine compounds as related to syphilis and to estimate their value in the treatment of the disease at the present time.

Of the various compounds, the easily soluble, readily absorbable, potassium iodide has always enjoyed the greatest popularity. The iodides of sodium, ammonium and strontium have also been used, it is true, and the sodium salt in large doses is considered to be less depressing than corresponding doses of potassium iodide. In recent years many new compounds containing iodine have been introduced, but none of them has succeeded in displacing the simple alkaline salts despite the extravagant claims made for them. The systemic action of iodine is exerted not only by iodine itself, but also by all readily decomposed substances that contain iodine. Indications for the internal administration of all these preparations are essentially similar, for with all of them the effects are due to the action of the iodine itself.

Pure uncombined iodine is extremely irritating to the mucous membranes; the neutral salts are very much less irritating, and some of the newer organic preparations are said to be entirely free from this unpleasant action. The salts of iodine are absorbed slowly by the stomach, very rapidly by the small intestine, and somewhat less quickly by the colon. Some iodine is absorbed also from the skin, when painted on it in the form of the tincture or when deposited upon it as fumes.[4] The alkaline salts are very rapidly absorbed unchanged by the gastrointestinal mucosa and they are very quickly excreted by way of the urine, of the secretions of the mucous membranes of the respiratory passages and of the gastrointestinal tract, of the tears, of the sweat, and, to less extent, of the secretion of the mammary glands. The organic compounds are less quickly absorbed and are more slowly excreted. It has been urged that this delay in excretion gives them an advantage over the very rapidly eliminated inorganic salts.

An occasional unpleasant feature of iodine therapy is the occurrence of iodism. The greater part of the iodide that is absorbed circulates in the blood for a short time only and is excreted. According to Cushny,[5] 65 to 85 per cent appears in the urine within twenty-four hours, and no reaction for iodine can be obtained in any of the secretions a week after administration has ceased. Some of the iodine does not reappear in the excretions, and the state of this portion in the body has been the subject of much speculation. The amount retained is said to vary with different persons, but is constant for any single person. Presumably, it is the iodine retained in the body that exerts the desired therapeutic effect, and it is the rapid excretion of the larger portion that gives rise to iodism. Fortunately, the kidneys themselves escape any harmful effect, but if they have already been damaged and their functional capacity decreased the symptoms of iodism

are more readily induced. The commonest symptoms of iodism are those of catarrh of the respiratory passages. There may occur also headache, an unpleasant metallic taste, coryza, lacrimation, cough, symptoms of gastrointestinal irritation, and various skin eruptions. In unusual cases of marked idiosyncrasy there may be edema of the face, serous effusions, and even fatal edema of the glottis. Fortunately, these grave results are very rare, and most patients tolerate the drug in ordinary quantities with few or no symptoms. Iodism may be induced by very small doses; indeed some authorities believe that small doses are more apt to cause iodism than larger ones, but Cushny maintains that this is doubtful. The action of iodine is capricious and different statistics show great discrepancies. Tolerance can soon be established in most cases, and on increasing the dose the symptoms of iodism disappear.

The effects of iodine administration upon the general nutrition have been much discussed. The general emaciation that occurred in some patients and the atrophy of certain glandular organs, especially of enlarged thyroids and of mammary glands, led clinicians to consider the effect of iodine upon metabolism, but experiments have shown that the iodides have no power of influencing metabolism in the ordinary sense. What appeared to be such a direct influence may doubtless be accounted for by an indirect effect brought about through the action of large doses upon the gastrointestinal mucous membrane with the production of nausea, anorexia, diarrhea, etc. Ordinarily, a deleterious effect upon nutrition, even after the use of large amounts of iodide for months, does not occur except in patients exhibiting certain types of goitre.

Iodine is a normal and necessary constituent of the thyroid gland, and the study of this constituent has been of great interest in connection with all attempts to isolate the active principle of the gland. A deficiency of iodine is associated with definite histological and functional changes in the thyroid, and the administration of small amounts of iodine in such cases increases the amount of organically combined iodine in the thyroid and induces easily recognizable alterations in the gland. Marine[6] advocates the use of small doses of iodides in the prophylaxis of simple goitre and has demonstrated its value by experiments on a large scale among the schoolchildren of Cleveland. It must be remembered that the administration of iodine in any form to persons suffering from mild forms of exophthalmic goitre or with a tendency to this disease may result in the production of outspoken symptoms of Graves's disease.

This increase of the organic iodine of the thyroid gland after the administration of inorganic iodide is one of the facts adduced in the discussion concerning the chemical behavior of iodide compounds in the body by those who believe that iodine is set free in the body in elementary or molecular form and as such exerts its systemic effects. Cushny[5] and Meyer and Gottlieb[7] take this view, whereas Sollman[8] maintains that he has not encountered any direct evidence of the liberation of elementary iodine in the tissues nor any detailed nor convincing analysis of the conditions under which this could occur. He concludes after certain investigations that free iodine cannot be liberated in the body since all the conceivable reactions for the liberation of iodine from its compounds require a much higher hydrogen-ion concentration than exists anywhere in the body except in the gastric contents. He upholds the view that the effects following the administration of iodine compounds are produced by the iodine ion. Meyer and Gottlieb state that the "action which we know as iodine action is, however, not to be attributed to the iodine anions, but to the iodine molecules. For it is these that form organic combinations with various constituents of the body. It must consequently be asumed that HI is set free from KI in the organism and by oxidation is transformed into I_2, and that then this produces the specific action, perhaps after ionization in the form of iodine-cations."

As has already been stated, the therapeutic action of iodine compounds adminis-

tered internally in syphilis and in sporotrichosis is not a parasiticidal one, either upon the *Treponema pallidum* or upon the *Sporotrichum schenckii,* though the lesions due to both microörganisms respond quite favorably to iodine therapy. Numerous hypotheses have been advanced to explain the mode of action of the iodides in such diseases. Most of these have only an historic interest. It is now universally admitted that the action of iodides is exerted upon the granulomatous tissues formed during the inflammatory reaction to the injury induced by the infecting organisms. Under the influence of iodine preparations these granulomata resolve, while the parasites remain unaffected, though presumably they may be rendered more easily accessible to truly parasiticidal drugs like mercury and arsenic. Theoretically, one might suppose that in cases treated with iodides alone such interference with the natural defensive mechanisms of the body might not always be salutary; but in the experience of the older clinicians the use of iodine alone usually delayed relapses, if it did not prevent them.

One conception of the mechanism underlying this resolvent effect of the iodides frequently encountered in the literature is based upon the supposition that iodides induce a remarkable stimulation of the mononuclear leucocytes, greatly accelerating their phagocytic activity. There is but little real evidence to support this view, though there are a few reports of experiments (such as those recorded by Gorescu[9] in 1905) in which there was observed a marked increase in the activity of these cells under the influence of iodine in affecting the resorption of granulomata caused by the injection of inert powder into the peritoneal cavity of rabbits.

The most plausible, perhaps, of the explanatory hypotheses that have been advanced is that of Jobling and Petersen,[10] an outcome of their work on tryptic and antitryptic activity. These investigators believe that antitrypsin is the most important factor in preventing the resolution of necrotic tissues such as those in infarcts and in the caseous areas in syphilis and tuberculosis. They have demonstrated to their satisfaction that the ferment-inhibiting action of serum and of tuberculous material is due to the presence of certain compounds of unsaturated fatty acids. When these unsaturated fatty acids are removed, or when the unsaturated valences are satisfied by combination with iodine, the ferment-inhibiting action is greatly lowered and autolysis occurs. Jobling and Petersen tested the sera from a series of patients under treatment with iodides and found a definite decrease in the antitryptic strength of these sera as the dosage was increased up to the point where iodism occurred; at that point the antitryptic index promptly returned to the previous high level. They attribute this phenomenon to a mobilization of the lipoids by the toxic action of the iodine, which thus defeats the purpose for which the iodine is given. Many clinicians have accepted this hypothesis, but all do not agree that the presence of symptoms of iodism precludes a favorable effect of the iodine therapy.[11]

Studies on the distribution and chemical combinations of iodine in the body may also be regarded as favorable to Jobling and Petersen's suggestion. Many workers have reported that after the administration of iodides and other compounds of iodine, the blood is found to contain a relatively large amount of iodine, whereas various organs and tissues contain a less amount. Loeb[12] demonstrated that iodine penetrated into syphilitic and tuberculous tissues to a greater extent than into normal tissues. The older view that iodine tends to combine especially with the proteins of the body has not been upheld by more recent work. McLean[13] found in experimental animals that the lipoid fraction of tissue contained 32 per cent and the water-soluble fraction 67 per cent of the iodine absorbed, whereas the extracted protein contained no iodine at all. Fujisawa,[14] in an elaborate experimental study, administered to a variety of animals samples of the various types of iodine compounds, including potassium iodide, albuminous iodine compounds, and

lipoid iodine substances, and studied the distribution of the iodine and its chemical combinations in normal and in pathological tissues. He states that when potassium iodide is used, iodine can be demonstrated in the fatty tissues and in the brain and spinal cord. In this he does not confirm the opinion of Loeb, who believed that potassium iodide is neither lipotropic nor neurotropic. In the organs, according to the Japanese author, iodine is always found combined with the fatty and lipoid substances, not with albumin. Organs containing tuberculous and syphilitic masses take up more iodine than do normal organs, and in the pathological tissues the iodine is found combined with the lipoids, not with the proteins. Carcinomatous tissues take up more iodine than do normal organs, but, on the other hand, sarcomatous tissues have a smaller iodine content, standing in their holding of this substance between the organs of largest and those of smallest iodine content. The softened portions of these malignant tumors contain more iodine than do the unchanged portions. Here, also, the iodine is found to be combined with the lipoid substances. The iodine in exudates seems to exist as an alkaline iodide rather than in organic combination.

In chronic poisoning from lead and mercury, the administration of iodides is believed to hasten the elimination of these metals. They have not, however, been shown to be of more value in this respect than are other halogen salts, such as the chlorides and the bromides. This belief in the efficacy of iodides in mercurial poisoning has suggested that in tertiary syphilis they may act only by aiding in the mobilization of the mercury previously stored in the tissues. This suggestion, however, must be incorrect, for the iodides are certainly of value in cases in which mercury has never been used.

Enough has been set down above, perhaps, to give a general impression of the present-day conception of the pharmacological action of the iodine compounds. A few dangers and discomforts attending their use have already been referred to. It may be said, in addition, that, in the presence of active tuberculous lesions, iodides should be administered with watchful caution. The effects of iodides are exerted not only upon syphilitic lesions but upon other infectious granulomata as well, and in the case of tuberculosis the resolution and softening of the pathological tissue may have a deleterious effect in favoring the spreading of the infection. Thus far, unfortunately, no specific chemotherapeutic agent with which to attack the tubercle bacilli has been discovered.

The value of the iodides in the treatment of syphilis has been attested for many years by the ablest clinical observers. Osler[15] asserted in 1916, that "in the treatment of the *visceral lesions* of syphilis, which come more distinctly within the province of the physician, iodide of potassium is of equal or even greater value than mercury. Under its use ulcers rapidly heal, gummatous tumors melt away, and we have an illustration of a specific action equaled only by that of mercury in the secondary stages, by iron in certain forms of anemia, and by quinine in malaria." It is in the tertiary and the late secondary stages of lues that the iodides have been of the greatest service. It is at this period of the infection that numerous lesions may be found, large or small, in all of which the essential pathological features are the same, namely, more or less necrosis of tissue, the accumulation of mononuclear leucocytes, and the formation of new fibrous tissue. Since we recognize now the basic similarity of the lesions of syphilis, it is reasonable to suppose that the striking effect of iodides, appreciable in the case of large lesions, the resolution of which may be clinically observed, has its parallel in a similar but less readily recognized change in the smaller lesions, and it is also a reasonable supposition that, with the resorption of lesions, the organism of syphilis is made more accessible to attack by the parasiticidal drugs. This would appear to be reason for the use of iodides, even in cases that show no gross lesions. To sum up, then, the attitude of most conservative clinicians to-day, who are

actively engaged in the treatment of syphilis, is that the iodides are valuable remedies in the symptomatic treatment of syphilitic lesions and for relieving the pain due to such lesions. There is a general feeling, also, that the iodides contribute, in the way above mentioned, to the efficacy of mercurial and arsenical treatment.

There is, perhaps, no condition other than syphilis in which it is more incumbent upon the clinician to bring to bear with thoroughness all of the best in the therapeutic armamentarium that scientific medicine affords. Each patient should be carefully and comprehensively studied in order that minor defects may be corrected, that the state of nutrition and the general health and strength may be preserved and built up. In other words, when treating syphilis, the patient as a whole should be most carefully considered as well as the attack to be made directly upon the infecting microörganism. In arsphenamine, most fortunately, we have a powerful addition to our antisyphilitic resources; but it cannot be said that parasiticidal chemotherapeusis in syphilis has abolished entirely the need of symptomatic treatment. No form of treatment that is a distinct aid dare be neglected.

The iodide of potassium is still generally accepted as the most valuable of the iodine compounds in the treatment of syphilis. It is usually prescribed in strong solution, an ounce of the salt being dissolved in an ounce of water, with the direction that the drug shall be greatly diluted as each dose is administered. Since an idiosyncrasy to the drug may be encountered, small doses are usually employed at first, say five grains, three times a day, preferably given a half or three-quarters of an hour after meals. Even when mild symptoms of iodism occur, they will usually disappear on increase of the dosage to ten or fifteen grains thrice daily. The dose has sometimes been increased, up to three hundred grains (twenty grammes) or more a day. Large doses may cause gastric irritation, due to the salt action, symptoms that are quite distinct from those of iodism. This irritation may be obviated to some extent by administering the drug in milk or in whey. Engman[16] warns against the use of the excessive doses sometimes employed, especially in certain health resorts where many patients are treated. Fournier[17] was also strongly opposed to what he called "iodide debauches;" he seldom gave more than from forty-five to sixty grains daily. When tolerance for the drug is established, the curative value apparently diminishes and the dose must therefore be increased. To obviate this difficulty, D'Arcy Power[1] administers the iodides in full doses, in short courses frequently repeated, and prescribes a tonic mixture (containing iron, nux vomica, and dilute phosphoric acid) to be given during the intervals between the courses of the iodide. To give large doses continuously is, in his opinion, a useless waste of an expensive drug. Iodine may be given, if desired, by the rectum, or hypodermically in the form of iodipin; but it is rarely, if ever, necessary to choose these routes for the introduction of the drug.

Within recent years numerous organic iodine compounds have been placed upon the market as substitutes for the iodides. Extravagant claims have been made for some of them, both in regard to their therapeutic efficiency and their freedom from toxic effects. These preparations are of two general types: (1) the iodized albumins or proteins, and (2) the iodized fats and fatty acids. Of the former may be mentioned iodalbacid, iodized egg-white in several forms, iodglidin, iodalbin (N.N.R.); of the latter, iodipin (N.N.R.), the product of the addition of iodine chloride to oil of sesame, is marketed in two forms, one of 10-per-cent strength and the other of 25-per-cent strength, for hypodermic use. Sajodin (N.N.R.) is the calcium soap of a fatty acid obtained by iodizing erucic acid with formation of iodo-behenic acid; it contains about 25 per cent of iodine. McLean,[13] who has studied these organic preparations, has arrived at the following conclusions:

1. Up to the present it has not been shown that the organic iodine preparations,

with the exception of preparations of thyroid, have any specific action in pathologic conditions, except the action of iodine after separation from the molecule.

2. The iodized proteins seem to be of advantage for therapeutic use only in so far as they avoid gastric irritation. The more stable compounds are apparently not entirely split in the body and are therefore not well utilized. The less stable compounds have no advantages over the alkaline iodides, either as to local effects or as to rapidity of absorption and excretion.

3. The iodized fats and fatty acids appear to have some advantage when the continuous action of small amounts of iodine is desired. They are more slowly and evenly split, and the amount of available iodine in the blood does not vary from time to time to the extent that it does when the alkaline iodides are administered. The use of the iodized fats in such conditions as arteriosclerosis, bronchial asthma, lead-poisoning, etc., probably has some rational basis, therefore, on physiologic grounds. These substances are also as a rule non-irritant to the stomach.

4. The difference in frequency of iodism is probably due to the difference in the amount of available iodine present in the body at any one time. When large amounts of iodine are desired, as in cerebrospinal syphilis, avoiding the danger of iodism would be at the sacrifice of therapeutic efficiency.

5. The use of organic iodide preparations with toxic side-actions, due to the molecule or its splitting products, should of course be discouraged. The products of iodine with the higher fats and fatty acids are generally free from toxic actions.

It will be seen that the most favored organic preparations are those of iodine combined with fats and fatty acids. According to McLean, their composition depends on the fact that the free valences in unsaturated fatty acids may be satisfied by iodine. If one is favorably impressed by the hypothesis of Jobling and Petersen, it would seem more rational to administer iodine in treating syphilis in the form of the inorganic iodides rather than to introduce them in a preparation in which they are already combined with unsaturated fatty acids, and clinical experience is apparently in accord with this view.

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Syphilis in Hospitals for the Insane: Its Diagnosis and Treatment.

BY H. W. MITCHELL, M.D.

Superintendent, State Hospital for the Insane, Warren, Pennsylvania.

Syphilis is probably responsible for more cases of insanity than any other preventable cause. Dependable statistics based upon modern methods of diagnosis are, as yet, available only from a small percentage of the hospitals throughout the United States. Pollock says that in 1919 statistics drawn from twelve States show that 9.4 per cent of total first commitments were paretics. These figures, of course, exclude all cases of syphilis accompanying or causing other psychoses. The incidence varies from 8.7 cases per one hundred thousand inhabitants in New York to 1.3 cases in South Dakota. As the figures were obtained from only three States with many large population counties and nine agricultural States, it is probable that the percentage of cases is less than would be obtained in the entire United States were the complete figures available. Kirby has shown that every fifth male patient committed in New York State from cities had paresis, while only one in twelve from the rural districts was similarly affected.

Psychoses with non-paretic cerebral syphilis formed 0.7 per cent of total cases. In hospitals of eastern States with large manufacturing centers, the prevalence of syphilis is indicated by the figures of the Warren State Hospital, where for ten years past serological studies have been made upon all patients. Syphilis was found in 15.7 per cent of thirty-six hundred patients admitted during that time, over three-fourths of the number having some form of neurosyphilis producing mental symptoms that necessitated commitment. Male cases have outnumbered the female in the proportion of three to one. Any correction of these figures for possible error would result in higher rather than lower percentages.

The prevalence of syphilis in any community can be roughly estimated by an appreciation of the fact that neurosyphilis causing insanity occurs in less than 5 per cent of total syphilitics. Despite the probable incomplete returns to health officers, syphilis in New York City, for years, has been one of the four or five most commonly reported diseases. The last chapter must be read in the mortality statistics. Salmon has estimated that among the deaths in New York State, of men between the ages of forty and sixty, one in every nine is due to paresis. Thus, in the most productive age, neurosyphilis exacts a toll that should justify every medical and lay effort for its extermination. Our present knowledge of the disease, its prevention and treatment, justifies the belief that in one generation it would become relatively of rare occurrence if all applicable measures of control could be adopted. Any sane and efficient attempt at prevention must include a study of the source of infection and proper measures for its medical control, the treatment of the patient, and prevention among those having familial contact with the infected person. Any measures short of full consideration of these three points of attack contribute to human suffering and perpetuation of a common and deadly disease. The Pennsylvania Department of Health is working quietly and vigorously to accomplish these very ends and deserves the sympathetic support of every thinking person, as do all similar agencies elsewhere. An adequate control of syphilis requires board of health supervision under regulations that shall spare the tractable patient undue publicity and with quarantine control of all others until discharged from treatment. The custom of quarantining a case of German measles while allowing sex offenders, male or female, to spread the disease at will is an anachronism which will assure a continuous supply of neurosyphilitics, until medical treatment shall accomplish much more for the prevention of this complication than has hitherto been possible.

Hospitals for the insane have an opportunity to render no inconsiderable help in preventing late neurosyphilitic complications among the families of their patients, where infection is all too commonly found. Increasing numbers of such hospitals are calling attention of the families involved to the necessity of blood and fluid studies in the immediate relatives of paretics and instituting treatment when needed, and at a period of the disease when treatment offers the most hope of a cure. Family infection is all too common in such groups. Heyman and Raynor report the finding of family infection in 29.2 per cent of a series of cases personally examined by them; husbands, wives and children naturally being the ones infected. As one blood Wassermann reaction was used for diagnosis, it is probable that the actual incidence of family infection was hardly told by their figures, though they demonstrate clearly the need of family study where paresis is found in one of its members.

The knowledge we have of the life history of patients with neurosyphilis is too meager for any statistical deductions of positive value. We know that symptoms of paresis may rarely develop in from one to two years after infection, or again after over thirty years have elapsed, though the majority of cases develop between ten and twenty years following infection. In some instances there has been no constitutional treatment, while others have had years of treatment under competent physicians. It occurs among those who use alcohol immoderately, even as it does in total abstainers, among those who live well-ordered lives and also among those who do not. We have, at present, no definite criteria which enable us to assure a syphilitic in the early stages that neurosyphilis may not be a sequel. The best assurance of freedom from this complication that can be given follows lifelong observation, clinical and serological study at intervals, with treatment when and as indicated. It were well that we should talk less of the "cure" of syphilis in the early stages of the disease, even admitting the possibility, until after a thirty-year period of observation of the "cures" we found among them no cases of late neurosyphilis to mock our faith in therapeutics.

Many speculative theories have been advanced in recent years, even as formerly, to account for the development of neurosyphilis. The spinal fluid is commonly found to show a positive Wassermann reaction in a considerable percentage of cases soon after infection, and it is argued that a mesoblastic invasion of the brain occurs at this time, remaining latent under treatment for years before giving symptoms due later to a parenchymatous extension of the disease with resulting paresis. It is argued that patients thus affected are the potential paretics of later years.

Marie and Levaditi have made an interesting contribution to the theory of a neurotropic strain of the Spirochæta pallida as differentiated from the dermotropic, and cite some interesting experimentation in support of their contention that the neurotropic virus is alone responsible for later neurosyphilis. It would seem that familial paresis would be much more frequently observed than is now the case were its occurrence due solely to infection by a neurotropic virus. We still await convincing demonstration of the factor or factors which determine the occurrence of late neurosyphilis in the small percentage of total infections..

Diagnosis.—Since the discovery of the Spirochæta pallida as the infective agent of syphilis, numerous laboratory methods tending to promote accuracy in diagnosis have been accepted as reliable aids in differentiating neurosyphilis from other cerebral disorders. They should not be used to the exclusion of history and neuropsychiatric examinations, which are as valuable and necessary as formerly. Serological tests unquestionably make the diagnosis in cases that for a time, at least, would otherwise escape detection. They contribute immeasurably to early diagnosis and should be used in routine for all new admissions to hospitals for the insane. On the other hand, cases of paresis have been reported which have gone to autopsy with confirma-

tion of diagnosis, showing negative findings in both blood and fluid, upon repeated examinations. If this is possible in paresis, it would seemingly be more commonly observed in less serious disturbances. The necessity of using all possible means of diagnosis is apparent, especially in that relatively small group of cases in which there is no apparent corelation between laboratory and clinical findings. Solomon and Klauder have called attention to the many types of neurosyphilis in which a negative blood and fluid was apparently persistent, and for the use of the provocative Wassermann test as a further aid to accurate diagnosis.

One or even several negative results in examination of blood and fluid should not lead the physician to exclude syphilis or to discard that diagnosis when history and clinical observation point the way. *Per contra*, the physician who jumps to the conclusion that every patient on whom he receives a report of a positive Wassermann must have syphilis, in lack of any other evidence of the disease, will unquestionably make avoidable errors. The Wassermann technique offers many opportunities for faulty findings in the hands of an incompetent technician, whose knowledge of the subject is gained from little study of the principles involved and poor technique. Laboratory findings not in accord with clinical evidence call for repeated examinations and checking by resort to other laboratory workers. Wassermann reactions upon the blood of neurosphilitics, whether or not under treatment, will often be negative in the course of the disease. Variations of this reaction upon the spinal fluid are less common. In fluid examinations, Lange's colloidal gold test appears to be more constant and delicate than the Wassermann.

Warwick and Nixon report eighteen cases of paresis with gold test positive in 94 per cent, while 83 per cent showed a positive Wassermann. In tabes a positive gold test was found in 80 per cent, with positive Wassermann in 52 per cent of seventy-four cases. In tumors of the brain and cord, the gold test was positive in Zone 3 of 55 per cent, while the Wassermann was negative in all of fourteen cases. Approximately the same result was obtained in multiple sclerosis, these cases usually showing a gold test reaction in Zone 2.

Weston has shown that the two reactions are produced by separate substances that may be found in the fluid, independently of each other; also that the gold test gave positive findings in one untreated case for two years before the appearance of a positive Wassermann in either blood or fluid. This patient ultimately died, and the autopsy confirmed the diagnosis of paresis.

This corroborates the opinion of Solomon that the gold test often appears first, and in treated cases is the last to disappear. This latter observation agrees with our results at the Warren Hospital. After ten years' use of this test we have two cases, reported by Weston, showing variable results with the gold test over a period of several years, but giving no other evidence upon which a diagnosis of syphilis could be established. We have no record of a paretic, however, who at some stage of the disease has not shown a positive gold test, in the "paretic zone." In earlier days it was thought that a differential test between neurosyphilis of the paretic and non-paretic types was at hand in the gold test, but numerous observers are now inclined to doubt if this differentiation is possible in all cases and stages by any known method, and to argue that all cases should be treated intensively in the hope that improvement and remissions may follow. The globulin test, in our experience, is less reliable than those mentioned. It has been shown from our cases that the cell count in untreated patients may vary so greatly that it alone is wholly unreliable as a guide to prognosis or aid in estimating the value of treatment, though a pleocytosis is nearly always present at some time of the disease, and is therefore of confirmatory value when considered with the more pathognomonic findings.

Positive findings by the more dependable

tests are usually indicative of neurosyphilis. Both the gold and Wassermann test should be used, and when both are positive there can be little doubt as to the diagnosis. When negative tests are obtained, there should be repeated tests at intervals before syphilis is excluded in doubtful cases arising in neuropsychiatric practice.

Syphilis occurs frequently in psychoses not related to neurosyphilis, and again may be considered the major factor in atypical psychoses. Lowrey reported a positive blood Wassermann in 7.5 per cent of fifteen hundred insane commitments showing no evidence of syphilitic cerebral disturbance. Only a few of these cases showed changes in the spinal fluid. He also reports a series of fourteen undoubted cases of neurosyphilis with clinical symptoms sufficient for diagnosis in only four. The necessity for lumbar puncture as a routine in doubtful cases is thus emphasized.

Ross calls attention to the fact that these reliable diagnostic methods are used as a routine measure in only a small percentage of hospitals for the insane in this country, and that treatment is equally neglected. Improvement of this condition is most desirable, not only for the undoubted benefit that would result to many patients, but also for the spread of general information concerning a disease which is fortunately so amenable to methods of prevention, could physicians and the public unite as they have to control tuberculosis.

Treatment.—Many years ago, when paresis was regarded as a parasyphilitic disease, and treatment was generally considered hopeless, Dana called attention to the fact that treatment of paresis must be vigorous in the early stages, before destruction of brain tissue by the progress of the disease had resulted in dementia, through organic destruction of brain tissue. He reported remission of symptoms for long periods in cases that had received intensive and prolonged mercury and iodide treatment after showing symptoms that indicated paresis, and cited other cases showing similar symptoms that without treatment had died from that disease.

After the many forms of treatment that have been suggested and generally tested in the last ten years, it is doubtful if one is justified in expressing more optimism in the treatment of such neurosyphilitics as are commonly admitted to hospitals as insane persons. Destroyed neurons cannot be restored more than formerly, and in the case of committed paretics extensive cortical damage is to be suspected before hospital treatment can be adopted. The combination of arsphenamine, mercury and the iodides is generally accepted as better than mercury and the iodides alone, and to that extent we are better prepared to treat the disease. There are comparatively few observers, among the many following the therapeutic efforts of recent years, who will predict favorable results from the treatment of to-day with less caution than Dana exhibited twenty years ago. There is no sure criterion for differentiation of early paresis from other forms of neurosyphilis that have always been supposed to improve under treatment, so that it is not possible to record a cure of paresis when a proven neurosyphilitic shows continued improvement under treatment. In cases farther advanced so that diagnosis of paresis can be established beyond reasonable doubt, remissions serological, clinical and sociological are unquestionably much more commonly reported as a result of treatment that is becoming more and more general in practice among the insane. Many such remissions lasting for years have been reported, though in many other patients the disease has recurred and progressed fatally. The results as reported from many sources justify active, long-continued therapy, especially in the early stages of paresis and in all patients showing syphilis as a complication of other psychoses.

Beginning with the report of Swift-Ellis in 1912 for intraspinal therapy, there have been many modifications based upon their contribution, which consisted of drawing the patients' blood after an arsphenamine intravenous treatment, separating the serum, diluting it to 40 per cent with normal saline solution, and injecting 30 cc of the

solution at body temperature into the canal, first withdrawing a somewhat less amount of fluid.

Ogilvie used small quantities of arsphenamine dissolved in sterile water and added this to the serum obtained by the Swift-Ellis method, while Byrnes combined small amounts of bichloride of mercury with the serum, which in both instances was introduced into the spinal canal after the Swift-Ellis technique.

Then followed the introduction of these various solutions by the subdural and intraventricular routes, and later by puncture of the cisterna magna.

Spinal drainage before intravenous use of either arsphenamine or mercury has also been freely used. The injection of the patients' serum intraspinally several hours before intravenous medication was recommended on the hypothesis that irritation of the meninges caused increased permeability of the choroid plexus to arsenic. Serum prepared by the Swift-Ellis technique and modified by the Ogilvie and Byrnes methods has also been used in the same manner.

Intraspinal therapy has many advocates, principally confined to those who deal with the non-insane patients. Most of its supporters favor its use in connection with the intravenous use of arsphenamine. Gennerich in drawing conclusions from results of treatment in many cases of neurosyphilis, under observation for years, uses intraspinal treatment, preferably in the latent stages. He reports remissions lasting for years in early paretics. While admitting that arsenic following intravenous therapy filters into the spinal fluid, he believes it is in such dilute solution as to be practically inert. Fordyce has strongly advised the intraspinal treatment. Nonne reports somewhat negative results and expresses no positive opinions for or against its use. Sachs is one of many who believe that all value of arsenic therapy is obtained by intravenous therapy. Solomon advocates intensive and prolonged intravenous therapy, using any or all other methods before confessing failure. These fragmentary reports giving the views of men with long experience and much material might be duplicated many times from other sources without bringing conviction to the reader that any advice given was final and conclusive.

Intensive and prolonged treatment, by whatever methods used, of all insane neurosyphilitics will unquestionably result in more remissions than formerly observed. Disappointments over efforts will be many, but on the whole the results will justify the effort and expense incurred.

The choice of arsenical preparation and amounts used is one of the questions that must be solved by individuals. Schamberg states that in the United States and Europe, neoarsphenamine is used five times as frequently as arsphenamine. Ross reports Young as stating that neoarsphenamine was used exclusively in the French and American armies and very largely in the British and German forces.

Neoarsphenamine in doses of 0.75 gm. triweekly has been used freely at the Warren Hospital for periods of weeks, followed by intravenous use of cyanide of mercury, gr. 1/5, at similar intervals, and a later course of iodides. The intraspinal method is used much less frequently than formerly. Spinal drainage has not been used for some years as a routine measure.

The results of such therapy appear comparable with those reported from other sources. Whatever favorable results, temporary or permanent, may follow treatment of the insane neurosyphilitic, the first efforts for control of the condition must be made by others than the hospital physicians. There must be competent board of health supervision of syphilitics to insure adequate treatment and prolonged supervision of all cases, with control of the sources of infection. Treatment of infections should be prompt and thorough upon diagnoses established, when possible, before the appearance of constitutional symptoms. Blood and fluid tests should be used at intervals throughout the lifetime of syphilitics and treatment pushed vigorously when indicated. Provision should be made for the support of clinics where indigent patients and their families can have full benefit of

the best diagnostic and therapeutic methods. This is an imperative necessity, as the expense of such measures is entirely beyond the means of the average workman. With the general adoption of such measures it is reasonable to conclude that syphilis with all its serious complications would be a rapidly disappearing disease, and that until such measures become effective the rather unsatisfactory treatment of neurosyphilis will continue to be a problem for the neuropsychiatrist.

The Technique of Arsenical Preparations in the Treatment of Syphilis.

BY JOHN L. LAIRD, M.D.

Chief of the Division of Laboratories, Pennsylvania Department of Health, Philadelphia, Pa.

Arsenical preparations in the treatment of syphilis to-day mean salvarsan or arsphenamine and its derivatives. It seems just, however, to mention the earlier arsenical preparations used less successfully in the treatment of this and allied diseases, which formed a basis and initiative for the discovery of salvarsan.

Donovan, an Irish surgeon, is reported to have been the first to use arsenic in the treatment of syphilis, in the form of arsenic, mercury, and iodide. Such well-known authorities as Hutchison and Fournier advocated its use before the discovery of the numerous organic preparations which preceded arsphenamine. Atoxyl, the sodium salt of p-aminophenyl acid, was the first of this group and was demonstrated by Uhlenhuth in 1907 to be a powerful remedy in syphilis. Soamin, almost identical chemically with atoxyl, and orsudan (sodium methylacetylaminophenyl arsenate) have been more or less successfully used as antisyphilitic remedies; but have the common disadvantage of being exceedingly toxic to nerve tissue, particularly of the eye. If given in sufficient dosage over an adequate period of time, optic atrophy and blindness frequently result. These preparations are administered subcutaneously every or every other day for a limited number of doses.

Starting with atoxyl as a basis, Ehrlich built up many organic arsenical compounds on the benzol ring. The one which proved most destructive for spirochætæ and the least toxic for the human tissues was salvarsan, the dioxydiaminoarsenobenzene dihydrochloride. Since its discovery and passage through experimental stages in 1910 and its presentation to the profession in the latter part of that year, many techniques for its preparation and methods for its administration have been evolved. At first it was administered intramuscularly either in neutral solution or in oily suspension. This method was very soon abandoned for the intravenous injection, on account of its severe local reaction. At first the intravenous injection was largely performed by the open method because of the occasional faulty insertion of the needle by direct venous puncture, allowing subcutaneous extravasation of salvarsan to cause serious and obstinate local destruction. Now, venous puncture, becoming more perfect through practice, is the method almost solely adopted.

TECHNIQUE OF PREPARATION OF ARSPHENAMINE FOR INTRAVENOUS INJECTION.

Arsphenamine, a yellow powder, is preserved in small glass vials, either in vacuum or containing an inert gas, to prevent oxidation, which takes place very rapidly upon exposure to the air. The first precaution in its preparation for use, therefore, is to note that the vial is perfect and has served this purpose. The powder must be dissolved in sterile water or normal salt solution, and, being the dihydrochloride, must be neutralized with sodium hydroxide. The initial

amount of water or salt solution is dependent upon the final dilution desired for injection; in the last few years there has been a tendency to concentrate the solution, the full dose of 0.6 grm. having been given in as little as ten cubic centimeters. To follow a method of choice, however, a discussion of which will ensue, the arsphenamine should be dissolved, by gentle agitation in a suitable sterile receptacle, in about thirty cubic centimeters of sterile salt solution, at about 120° F. After solution is complete it is neutralized by the addition, drop by drop, of 15-per-cent sodium hydroxide—about 20 to 25 minims being necessary for 0.6 grm. of the drug. The first addition of the hydroxide produces a yellow flocculent precipitate, the arsenical base, causing the solution to become distinctly turbid, which redissolves to the former clear yellow solution when enough hydroxide has been added. This should then be diluted to at least seventy-five cubic centimeters with sterile, normal salt solution, and should be administered immediately after preparation, at a temperature of about 100° F. There has been considerable discussion upon the subject of concentration of arsphenamine solutions, for intravenous administration, very high concentrations having been advocated. It has been our experience, however, that concentrations greater than 0.6 grm. in 75 cc of solution are more apt to be followed by both local and general reactions. Irritation of the endothelial lining of the vein in high concentrations must be quite marked, and persistent tenderness at the site of injection or even thrombosis and occlusion of the vein are not uncommon. It might be of interest to note, moreover, for its significance upon the greater probability of the causation of general reactions, that it has been proven experimentally that arsphenamine in concentrations greater than 0.6 grm. to 75 cc of solution causes hemolysis, while dilutions above this point do not. In a solution of 0.6 grm. of arsphenamine in 10 cc of normal salt solution, human blood corpuscles hemolyze almost instantaneously. If two or three minutes is taken for the administration of such a solution, as should be allowed, even for this small amount, practically all the blood of the body comes into more or less intimate contact with this destructive solution before much further dilution with the serum can take place. Although we realize that it is difficult to draw a perfect analogy *in vitro* to conditions *in vivo* in this respect, it is a fact worthy of consideration. Methods demanding high concentrations are usually dependent upon a desire to save time and trouble in administration. What little time is saved is more than offset by the attendant increase in danger.

Arsphenamine may be given in doses up to 1.2 grms.; the average being 0.6 grm. in the adult who has no serious contraindications to the use of the drug at all. Small doses, 0.3 grm., often repeated are preferred by some authorities, but are less effective than an equal amount given at one time up to the limit of human tolerance. It is conceivable in this respect to imagine that a very small dose, no matter how often repeated, would be useless as a combative agent to syphilis, as at no time would the drug be in sufficient concentration in the blood to be spirochetacidal.

THE TECHNIQUE OF THE PREPARATION OF NEOARSPHENAMINE.

Neoarsphenamine is the monosulphonate of sodium salt of arsenobenzol, or, more accurately, the sodium sulphoxylate. For administration, it is dissolved in sterile water or salt solution, preferably the former, and, being a neutral salt, does not require further treatment with sodium hydroxide. Sterile water is to be preferred to salt solution, as the latter, even in isotonic strength, tends to destroy this sodium salt and render it more toxic. It is also important that the temperature of the water should not be above 70° F., as higher temperatures affect the chemical combination toward increased toxicity. It is well to dilute neoarsphenamine also to 50 or to 75 cc for intravenous administration, although higher concentrations are more allowable than with arsphenamine.

The average dose of neoarsphenamine is 0.9 grm., this being equal to 0.6 grm. of

arsphenamine. Neoarsphenamine is on the whole less toxic than arsphenamine, being less likely to produce undesirable reactions, but it is also less active as an antisyphilitic remedy. Patients receiving repeated injections of neoarsphenamine and still remaining seropositive can very frequently be rendered seronegative by an injection of arsphenamine.

THE TECHNIQUE OF PREPARATION OF SILVER-ARSPHENAMINE.

Silver-arsphenamine or silver-salvarsan, the latest arsenical preparation advocated in the treatment of syphilis, is the disodium salt of the dioxydiaminoarsenobenzol with silver oxide, containing twenty to twenty-two per cent of arsenic and fourteen per cent of silver. It should be dissolved in sterile distilled water or salt solution, preferably the former, at a temperature not higher than 70° F. It is readily soluble, and being a sodium salt requires no further neutralization. The dose is given at from 0.1 to 0.25 grm. and should be diluted for administration to 50 or to 75 cc of water. Similar to neoarsphenamine, higher concentrations than those with arsphenamine are allowable, although not so much as with neoarsphenamine, as this drug is more irritating. The solution, unlike that of arsphenamine and neoarsphenamine, is of a deep brownish color. Silver-arsphenamine and neoarsphenamine should never be dissolved in salt solution greater than 0.4 per cent.

Although discovered by Ehrlich in 1918, silver-arsphenamine has been on the market only in the last two years, but since this many articles have been published upon its use, most of which have made claims of varying degrees of superiority of this drug over both of the older preparations. If one had considered the fact that arsphenamine contains approximately 30 per cent of arsenic, neoarsphenamine 20 per cent, and silver-arsphenamine 22 per cent, one could hardly credit, without some doubt, statements that this drug is twice as effective against syphilis as arsphenamine and three times that of neoarsphenamine (C. M. Calson, *A. J. M. Sc.*, March, 1921) which have appeared in a number of treatises upon this subject. Experimental work upon silver as a spirochetacide has proven it less efficacious than either arsenic or mercury, and, with a portion of the arsenic supplanted by the weaker silver, a less efficient remedy should be expected; in fact little, if any, stronger than neoarsphenamine, and probably having general reactive qualities about equal to it. Such a view we believe is being now corroborated by the further clinical use of this preparation. Borio de Medina *(Archives of Dermatology and Syphilology,* March, 1922) believes that there is no evidence of its superiority over the older preparations, and has disadvantages which put it in second place as an antisyphilitic for general use. Strauss, Sidlick, Mallas and Crawford *(J. A. M. A.*, March 4, 1922) make a definite statement based upon the serologic index that silver-salvarsan is much inferior to arsphenamine and neoarsphenamine. We believe it is equal to neoarsphenamine if used in higher dosage than that advocated and which seems to be tolerated. Its color is a disadvantage in certain methods of administration, it is less stable in solution, and is more locally irritating.

With all of the arsphenamine preparations it is advisable to use sterile distilled water, better double or triple distilled water for the solution. But it is more important to have the water or salt solution freshly sterilized, and that by boiling than to have it distilled. It has been a long observed clinical fact that arsphenamine prepared with triple distilled water which has been sterilized some time before use is more apt to give general reactions than that with water sterilized directly before use, even though not distilled. Efforts have been made to account for general reactions following the administration of arsenical preparations on the character and method of solution. Probably the most important factor to be considered in this is the amount of dissolved oxygen in the water at the time of preparation of the solution. We know that even in the form of a dry powder the arsenical preparations rapidly oxidize on exposure to the air; and oxidation

will take place much more rapidly in solution than in the dry state. Water exposed to the air at ordinary temperature will dissolve 4.6 volumes per cent of oxygen fairly rapidly. There is present, therefore, in water not freshly sterilized enough available oxygen in 100 cc to rapidly oxidize 0.07 grm. of arsphenamine or about one-tenth of the average 0.6 grm. dose to the toxic substance, arsenoxide; certainly enough to cause reactions which assume the practical degree of severity dependent upon the amount of dissolved oxygen which may be present and the length of time elapsing between the solution and the administration. With the latter factor, of course, there is the possibility of complete oxidation to the p-amino-m-hydroxy phenylarsenic acid, which is extremely poisonous, by the continuous supply of oxygen from the air to substitute for the dissolved oxygen in the solution used up in the oxidation process. Experiments leading to an increase in the amount of available oxygen in the solution also tend to prove its potent action. The addition of peroxide of hydrogen to the solution markedly increases the rapidity of the formation of arsenoxide. The electric current with the positive pole generating nascent oxygen exposed to the solution, with the negative protected in a porcelain cup, will cause complete degeneration to the aminohydroxyphenylarsenic acid in a few minutes; whereas the exposed negative pole, generating nascent hydrogen, will cause the preservation of the solution for a longer period than under ordinary conditions. It is of the utmost importance, therefore, to use for the solution freshly sterilized water or salt solution, and this sterilized by boiling so as to drive out all dissolved oxygen.

THE TECHNIQUE OF ADMINISTRATION OF ARSENICAL PREPARATIONS.

All apparatus used for preparing the solutions and for conducting its administration should be absolutely sterile.

The site of operation, by choice the cubital vein, either median basilic or the median cephalic, should be cleansed and sterilized with tincture of iodine or alcohol, or both.

A tourniquet should be applied to the middle of the upper arm, producing sufficient pressure to cut off the superficial venous return without interfering with the arterial flow, in order to render the veins prominent and give them their maximum lumen. An easily palpable vein is often a better choice than an easily visible one.

The mechanical techniques of administration of the arsphenamines are almost as numerous as the operators. Many of them have their advantages, one over the other, in the hands of the individual operators; and many of them have fundamental faults which are well to avoid. In illustration: the use of two solution receptacles, one for arsphenamine and one for salt solution, leading by joined tubes to the intravenous needle (Rochester Row military pattern, Taylor & McKenna), has the value of allowing a supply of pure salt solution at any time during the administration it may be desired, but is clumsy and gives a greater possibility for the presence of air in such system. The use of the syringe in place of the gravity method may be more convenient for the operator, but if so it necessitates the use of solution too highly concentrated and is more apt to lead to too rapid administration, with consequent serious results. The administration of any of the preparations should occupy at least two, or better three, minutes, and for the larger quantities five to ten minutes. The practice of allowing the blood to flow from the vein through the needle after venous puncture before the application of the tube from the burette or the syringe gives to a novice evidence that the needle is properly in the vein, but offers a greater possibility of air entrance, and is, with its attendant unnecessary bleeding, both unsightly and unsurgical.

The drawing of the blood from the vein into the syringe, either used separately or attached to the delivery tube of the gravity burette, may lead to clotting in the needle and interference with subsequent flow, and in the use of silver-salvarsan is almost useless, as the color of this solution masks the appearance of the blood in the syringe.

One of the simplest and the best, because of its simplicity and freedom from avoid-

able errors, is the use of the gravity burette with stop-cock and tube leading to a veterinary hypodermic needle of eighteen or twenty gauge, about two and a half inches long. The burette and entire system is filled with the diluting fluid of the proper temperature without the arsphenamine. Venous puncture is performed, the tourniquet removed, and the solution allowed to start flowing, noting the speed and ease of the flow and regulating it properly by raising or lowering the burette, and the presence or absence of infiltration under the skin at the site of injection. If the needle is not properly inserted and there is infiltration, this has been caused by the harmless water or salt solution and can be quickly stopped, the tourniquet reapplied, and the needle properly inserted. If the flow is right and the needle properly in place, the arsphenamine solution may then be added to this diluting fluid, which is in such amount at the time to make the total dilution desired. In the insertion of the needle, faulty positions and need of an after-dressing may be avoided by puncture of the skin slightly to one side of the vein, and then with a slight lateral hooking motion the vein is picked up and entered; this being more readily manifested to palpitation, than in going directly through the skin and vein wall. Simple pressure for a few moments after such an operation is sufficient, due to the fact that the puncture of the skin is not in juxtaposition to the puncture in the vein. It is also a good procedure before withdrawing the needle to either allow a small quantity of salt solution to flow into the vein or to lower the burette so that the needle fills with blood, in this way avoiding the extravasation of any irritating arsenical preparation under the skin.

The arsenical preparation may be and, from clinical observation for the best results, should be administered in tolerated doses at weekly intervals for three injections. An interval of six weeks should be allowed, during which time, from the fourth day after the last injection, mercury may be administered as an adjuvant, to determine by serologic test the maximum effect of the series of treatments. This is repeated if the serologic test proves the disease to be still active.

SUMMARY.

1. Mention is made of the arsenical preparations leading to the discovery of arsphenamine.

2. Methods of preparation of arsphenamine compounds and their administration are described and discussed.

3. Attention is called to the chemical nature and qualities of arsphenamine, neoarsphenamine, and silver-arsphenamine, their instability under certain conditions and their attendant reactions.

4. The dosage and frequency of repetition are outlined for the average case.

CONCLUSIONS.

1. Arsphenamine, neoarsphenamine and silver-arsphenamine are of value as antisyphilitic remedies in the order named.

2. Silver-arsphenamine will be increased in efficiency if increased in dose.

3. Concentration of arsphenamine solutions is to be avoided above 0.6 grm. of arsphenamine in 75 cc of salt solution; neoarsphenamine and silver-arsphenamine above 0.9 grm. and 0.25 grm. respectively to 50 cc of water.

4. Dissolved oxygen in the water for solution is a most important factor toward toxic preparations of the arsphenamines.

The Search for Specific Remedies.

In an editorial on this subject in the *British Medical Journal* of May 20, 1922, it is stated that among the most recent curative substances obtained by this line of investigation is the new remedy produced by the German chemical firm of Bayer, and known as yet simply as "205." It would seem, as Dr. Dale pointed out, to be a remarkably curative agent in trypanosome infections. An advanced case of sleeping sickness in a man was sent from the Liverpool School of Tropical Medicine to be treated in Hamburg (because the drug was not allowed to be exported from Germany), and after two injections the patient was,

within a few weeks, spending his convalescence in a walking tour in the Black Forest, and by all accounts has gone back to Africa a new man. A commission of German doctors, with the permission of the Colonial Office, has gone to Rhodesia to put the new remedy to a thorough test; the preparation has now been made available in England, and is being tried at the London School of Tropical Medicine.

The drawback to this promising remedy for human trypanosomiasis is that it has an energetic effect on the kidneys; it is too soon yet to say whether the damage is permanent, but there cannot be much doubt as to the choice between death from sleeping sickness and life with some renal impairment. The substance, it seems, is not a dye, like trypan-red and trypan-blue; when applied to the trypanosomes outside the body it does not appear to check their vitality, though the evidence on that point is incomplete. Dale suggested that when the constitution of this substance is revealed by the manufacturers it may provide the basis for a new conception of therapeutic processes, and perhaps the point of departure for progress toward yet greater success.

Dale dealt also with the organic compounds containing arsenic. He thinks it is clear that salvarsan does not by itself directly kill the spirochete; the body of the patient must in some way coöperate. The success of arsenical compounds naturally suggested the trial of substances containing the closely related antimony, and the old familiar tartar emetic (tartrate of antimony and potassium) has proved to be a remedy in its province quite as specific as salvarsan. Christopherson in Egypt conceived the idea that if tartar emetic was of use in kala-azar (as it certainly is), there was no reason why it should not be tried in bilharziasis. He found that its introduction caused not only the death of the trematode worms in the veins of the bladder and bowel which caused the infection, but also the destruction of the eggs and their irritating and penetrating properties. With Leiper's work in the field of prevention and this method of cure, the complete extinction of this serious and disabling disease may, Dale thinks, be predicted.

Another method of treatment to be mentioned in illustration of the subject is the use of emetine. When amebic dysentery became rife in the army during the war the knowledge then available suggested that the action of emetine as a cure for dysentery was the one clear example, among many to the contrary, of the direct killing of the parasite which caused the disease. When, however, Dale came to study the matter with Clifford Dobell, and particularly when amebæ were taken perfectly fresh and vigorous directly from dysenteric ulcers in the bowel, it was found that the chief alkaloids of ipecacuanha (of which emetine is one and cephæline another) had a surprisingly weak action on the amebæ. Really vigorous amebæ could be kept crawling about for two hours in a solution of emetine hydrochloride as strong as one per cent. Certain artificial derivatives were then made, including methyl-emetine, dimethoxy-emetine, and iso-emetine; the second of these was found to be ten times as poisonous for the amebæ and not nearly as poisonous for the animal as the natural product, but it had no therapeutic effect whatever. This, therefore, was the surprising result: that the curative action of these alkaloids was proportional, not to their poisonous action directly on the amebæ, but to their poisonous action on the patient; the body of the patient must play an essential and perhaps a primary part in the killing of the parasite.

Such facts as these afford some idea of the complexities with which the investigation of remedies is beset. In the production of a curative effect the body of the patient in all these cases plays a part which is not yet fully apprehended. The nature of the coöperation between the remedial agent and the living tissues is hard to unravel. But work in this direction is an essential step toward a further theoretical basis for rational, orderly, and steady progress in therapeutic investigation. The importance of such advance for the future of mankind is incalculable.

Editorial

THE SYMPOSIUM ON SYPHILIS.

In the March issue of the THERAPEUTIC GAZETTE we took much pleasure in publishing quite an exhaustive symposium upon the present status of the treatment of tuberculosis, and in this issue we present four articles written by men of large experience upon the treatment of that even more universal disease—syphilis.

We feel confident that our readers will find much of interest and value in these communications, as they deal not only with the theory of the subject, but also very definitely with the practical application of those drugs and measures best qualified to aid the physician in reaching results which will be most satisfactory to himself and his patients.

THE TREATMENT OF EMPYEMA, ACUTE AND CHRONIC.

One of the benefits, few though they be, that humanity has derived from the Great War lies in our improved methods of treating accumulations of pus in the thoracic cavity.

It has been shown that operations on the thorax are by no means as dangerous as they were supposed to be, less than ten years ago, and, possibly more important, it has also been shown that radical operation for the removal of fluid of any kind, but particularly pus, from one of the pleural cavities does not require the radical procedure which the best surgeons in this country and Europe heretofore deemed essential. This is not only an advantage in the sense that the patient is subjected to comparatively little danger in the way of shock at the time of operation, but also avoids the grave deformities and incapacitation which the operations of Schede and Estlander inevitably induced.

For many years surgeons and physicians were somewhat opposed to one another in regard to radical and moderate procedures. Many physicians claimed that they got excellent results by inserting a piece of tubing, with fenestrations, between the ribs and establishing drainage in empyema of the acute type, while the surgeons clung to the more radical operations, claiming that excision of a rib, or still more radical measures, were essential to cure.

Two papers have appeared recently which have a very direct bearing upon this question. One of them is by Lilienthal of New York, in the *Medical Times,* entitled "A Safe Method of Therapeutic Aspiration in Pleural Effusion," in which he well says that a number of methods have been devised to remove fluid, both serous and purulent, and shows that some of them are far too vigorous, first pointing out that the degree of suction induced by the vacuum bottle commonly employed is unduly strong, whereby evacuation takes place too rapidly, and also that it has been customary to drain the cavity until it was entirely empty, with the result, it is true, that in most cases no evil has arisen, but in others great distress, blood spitting, hemothorax, pneumothorax, and even sudden death have occurred.

Lilienthal's method is much simpler both for serous effusion, hemothorax, and pyothorax. After injection of 1-per-cent novocaine with 1:10,000 adrenalin into the skin, a small incision is made with a sharp knife, the cut just being long enough to be a loose fit for the cannula, which is usually about a No. 10 French. Further local anesthesia is induced by injecting the solution into the deeper tissues. He then takes a trocar and cannula, moistened with two per cent of lysol solution, the lysol being used as a lubricant. Attached to an offset of the cannula is a piece of sterile rubber tubing which should hang down so that gravity suction is obtained. On the withdrawal of

the trocar the escape of fluid begins. If under pressure, the flow is sudden and continuous until the pressure inside and out is identical, when the stream occurs in an irregular flow on inspiration and expiration. By this means the dull-pointed cannula which is left in the chest does not wound the lung, gradual expansion of the lung occurs, cough almost never takes place, and if by any chance air has entered the thorax, it is only necessary to place the end of the rubber tube under water and to pinch it on each inspiration of the patient so that neither air nor fluid can enter the chest. On expiration the tube is liberated and bubbles appear at the submerged end. By this means the patient soon forces out the air, particularly if he is told to strain when the glottis is closed, or to fill the chest as if beginning to speak a long sentence. When the pus is thick a No. 12 or 13 French may be used.

We may state that this has been the method that the writer has employed for a number of years with very slight variations, always teaches his students, and, from his experience, he intends to persist in its use until some better method is suggested, although occasionally for various reasons it seems wise to use the ordinary aspiration apparatus.

The second paper to which we refer is one contributed by Dr. John H. Gibbon to the *American Journal of the Medical Sciences* for April, 1922. In this paper he deals with the non-operative treatment of chronic empyema, emphasizing the deformities induced by the old radical operations, and tells us that since his war experience he has without exception resorted to the plan which he describes. He no longer makes an incision at the most dependent portion of the chest, because he wants to be able to use Dakin's solution and to leave it in the chest, a result which is difficult to obtain if the incision is a low one. He therefore gives up any attempt to remove from the cavity large masses of lymph and the liberation of the lung by separation of adhesions. Nor does he perform a resection of the rib. After making an opening sufficiently large he then inserts two or three Carrel tubes, through which fresh Dakin solution is introduced until the cavity is filled, its exact shape and size having been previously determined by the *x*-ray. By this means, too, we know the position which the patient should occupy during treatment in order to keep the solution in contact with every part of the cavity. It is true that this requires a certain amount of constant attention. At the beginning if more than one tube is used, one of them is left open at the end or a catheter is used in order to permit the thorough washing out of the cavity once a day, but every two hours enough of the Dakin solution must be added during the day and every three hours during the night to keep the cavity full. The fit of the tissues around the tubes should prevent the escape of the fluid. He insists that unless regular instillations of fluid are resorted to, failure will certainly result.

Finally, with the apparent disappearance of pus, smears are taken from the depth of the cavity and from the sinus, and when these are negative for three or four consecutive days the tube is withdrawn without regard to the size of the cavity, and the sinus and the skin about it kept sterile with iodine until closure takes place. He does not think it necessary to close the wound and advises against this being done. If perchance the cavity and sinus are not sterile when the tube is removed, pus will soon be found, the tube can be introduced, and the treatment renewed.

If bleeding occurs and organisms still be present, normal salt solution should be used for a time and then the Dakin solution resumed. In some instances the patients do so well under this treatment that they do not have to be confined to bed, but can actually follow some occupation, provided only that the frequent instillations are faithfully carried out, as, for example, when a wife is trained in their use. It is necessary, of course, to obtain fresh Dakin solution from some reliable source every two or three days or more frequently.

POSTOPERATIVE PULMONARY COMPLICATIONS.

We are firmly convinced that postoperative pulmonary complications occur with far greater frequency than is revealed by medical literature. First, because these complications are sometimes obscure in origin; secondly, because, as in many instances the patient recovers, it does not seem essential that a hard road, temporarily traveled, should be regarded as an incident in the experience of the patient. There can be no doubt, however, that the subject requires much more investigation than has been given it heretofore.

Some months ago in the editorial pages we quoted a paper which indicated that so-called acute dilatation of the heart was an exceedingly rare condition, and indeed the question was raised as to whether it ever occurred. Without meaning to deny that it does occasionally occur, we agreed with the writer quoted that oftentimes this diagnosis was made without an adequate basis.

Recently, Cutler and Hunt have published an interesting paper upon this topic, reviewing a very large amount of literature and printing temperature charts and *x*-ray pictures in support of the views which they advance *in extenso* in the *Archives of Internal Medicine* of April 15, 1922. They give the results of their study of 1604 cases submitted to some form of operative procedure under anesthesia. Sixty-three of these patients developed a pulmonary complication that might be attributed to the operative interference or to the anesthetic, and five of the sixty-three cases died. It is interesting to note that as a result of their work they claim that the idea that postoperative pneumonia is chiefly the result of aspiration is erroneous as they prove that there is an increasing amount of evidence to show that postoperative embolism is a large factor in producing pulmonary complications, basing their assertion, as we have said, both upon the literature on the subject, experimental and clinical, and their own investigations. Of course, they recognize that a focus of primary pulmonary disease is the cause, at times, of a subsequent complication, but it is not their main intention to deal with these cases, but with those which are presumed to have healthy lungs before operative procedures are resorted to. They have little faith in acidosis, so-called, as a factor in the production of these lesions, and while admitting that chilling and cold possibly have a remote influence, they are doubtful as to whether they are factors worthy of grave consideration. So, too, they deny that ether is responsible in those cases where it is employed and pulmonary complications ensue, insisting that venous thrombosis, pulmonary embolism and pulmonary infarction are the common conditions with which ether has nothing to do.

It is interesting to note that out of the 63 cases referred to, no less than 32 had pulmonary infarction, 2 pulmonary embolism; 16 had exacerbation of tuberculosis; 7 had bronchopneumonia, and one had lobar pneumonia. It is equally interesting to note that none of the 32 cases of pulmonary infarction died, but the two cases of pulmonary embolism had a fatal ending, as had also the one case of lobar pneumonia and the one case of bronchopneumonia. Cutler and Hunt believe that the anesthetist has been supine in permitting the surgeon to intimate that his administration of an anesthetic is the cause of subsequent trouble, and they are inclined to put the blame, so far as it may be placed, upon the surgeon. They further assert that postoperative complications occur even if the anesthetic is in the most skilful hands, that they occur with local anesthesia, and that they occur in greater relation to the mobility of the part than can be explained on any irritation hypothesis. They also found that 43 of their 63 cases of pulmonary complications followed celiotomies, indicating that abdominal operations are peculiarly prone to cause such unfortunate results.

It will be remembered that there is a noteworthy difference between pulmonary infarction and pulmonary embolism, the latter as a rule being rapidly fatal, whereas the former rarely causes death, although

we have seen cases in which it resulted in pulmonary abscess.

The characteristic symptoms of pulmonary infarction following an operation do not differ very materially, except in degree, from pulmonary infarction occurring in the course of cardiac disease or other maladies. They consist in sudden pain, the expulsion of sputum, which is usually blood-tinged, the quickening of respiration and pulse, and a rise in temperature, with signs of a local consolidation and sometimes a friction rub. This infarction can be recognized by the use of *x*-rays, and most symptoms usually disappear within a week.

Reiterating their belief that anesthetists and anesthesia should not bear the blame for these complications, Cutler and Hunt also express the view that a reduction in their incidence may be arrived at by avoiding trauma at the operation, maintaining active hemostasis, carefully controlling sepsis, and employing great caution in dealing with patients who have demonstrable disease of the lung.

THE IMPORTANCE OF CARE IN THE PREPARATION OF SALT-GLUCOSE SOLUTIONS FOR INTRAVENOUS USE.

On more than one occasion in past years we have called attention to the fact that the careless preparation of salt solution for intravenous injection is capable of causing much harm. Mathews as well as others has insisted upon the necessity of the solution being nine-tenths of one per cent for the human being, certainly not less than seven-tenths of one per cent, and it has also been pointed out that sodium chloride and water is not to be considered strictly speaking normal saline, but that if the best results are to be obtained other salts must be provided in its preparation, such as calcium chloride and potassium chloride.

In addition, it is to be recalled that it has been shown that the sharp reactions which sometimes follow injection of saline solution are due to the presence in the water which is used of protein substances derived from bacteria or other sources.

It would now appear that there is still one other point to be guarded against, although the exact significance and practical importance of this point may possibly be considered as yet not possible to determine. Thus Williams and Swett, in a recent issue of the *Journal of the American Medical Association,* referring to the chill and fever with prostration and weakness following saline injections, express the belief that there is a relationship between these symptoms and the hydrogen-ion concentration of the fluids employed, and they advance the idea that when a fluid of a much higher or lower concentration than that of the blood is injected into the circulation so rapidly, or in so large an amount, as to be in excess of the capacity of the blood to buffer or neutralize it, reactions will occur, for they have found that some of the fluids in use have hydrogen-ion concentrations much beyond the limits of safety.

They point out that the hydrogen-ion concentration of pure distilled water is 7.0, that of whole human blood is 7.3 to 7.5, and that hydrogen-ion concentrations of blood or tissues above or below these figures are not compatible with life. A patient becomes comatose before 7.0 is reached, or convulsed before 7.5 develops.

They also point out that many tissues of the body are extremely sensitive to changes in chemical reaction, particularly nerve and brain structures, and they even go so far as to express the belief that the explanation of the local reactions, commonly called "sore arms" after hypodermic injections, are due to the hydrogen-ion concentration of the fluid employed.

Perhaps the most important point to which they call attention, however, is that distilled water when subjected to different storage conditions becomes acid to some degree in a given time, due to the absorption of carbonic acid from the atmosphere; that old stock distilled water is quite likely to be very acid, and that its use in the preparation of medicines for

intravenous injection is very questionable if not dangerous. In other words, freshly distilled water would seem to be essential.

They have also found that glucose dissolved in distilled water becomes rapidly acid, so that it is quite unsafe for therapeutic purposes at the end of twenty-four hours.

Our readers will be surprised to learn that in the making of the average injection for intravenous use, they believe that tap water is much to be preferred to distilled water, and they insist that glucose solutions should not be kept in stock solution but be freshly prepared.

They find that buffer tablets designed to support the normal buffer substances of the blood, namely, the proteins, the plasma bicarbonates and phosphates, can be employed. Such a tablet of monopotassium and dipotassium phosphate salts in proper proportions and amounts, and weighing approximately 0.1 gramme, will, if dissolved in 20 to 100 cc of solution of higher or lower hydrogen-ion concentration, serve to adjust it to normal concentration.

HOW LONG IS THE LIFE OF TRANSFUSED RED BLOOD CELLS?

This is a subject about which there has been much debate. Until recently, chiefly by reason of the studies of Ashby, there seemed to be no adequate means by which conclusions could be reached. As a result of Ashby's work, it is believed that red blood cells transfused in cases of pernicious anemia last about three months, and he also goes so far as to conclude that there was no hemolytic toxin producing the anemia in this disease. He has also seemed to prove that the length of life of transfused corpuscles is about the same whether the anemia is primary or secondary. In a recent paper by Wearn, Warren and Ames, this matter is once more carefully gone over. They firmly believe that the blood cells when transfused carry on their function in the donee during their period of existence as well as they did in the donor.

The point of importance, of course, is not only how long transfused patients may be expected to be benefited by the gift which has been made to them, but how soon another transfusion should be resorted to. Of course direct transfusion carries a patient suffering from acute anemia over his critical period, but in severe persistent anemias the facts which these writers present would seem to indicate that the improvement may be expected to remain for from sixty to ninety days. Of course the real guide is the comparison of the blood count before transfusion, immediately after transfusion, and then week by week, the second and third transfusions being performed as the blood picture manifests relapse. The whole trend of the paper which we quote is, therefore, one which proves that transfusion is of much more permanent benefit to the patient than has heretofore been thought.

CERVICAL ADENITIS.

Among the triumphs of modern medicine may be mentioned the elimination of that form of the cervical lymphadenitis, usually tubercular, at one time so frequent as to have occupied some twenty years ago a large part of the surgeon's time in the removal of the enlarged nodes by careful dissection. This tedious work was often entrusted to a surgical intern, after he had attained sufficient experience as an assistant. It was regarded as one of the important means of training the younger generation in the proper use of the knife.

Gradually, and without exciting special comment, these cases became fewer and fewer in number, until now in the hospitals and clinics they are comparatively rare. The credit for the disappearance of these cases can justly be given to those enthusiastic throat men who, perceiving that the portal of entering infection was found in the tonsils, proceeded to remove these organs with first a zeal, later supplemented

by a skill, which has not only avoided a larger surgery, but which has had, in so far as we can judge, a most beneficial effect upon general health.

There have been some communications bearing upon the end results of these cases of tuberculous cervical adenitis, in the main indicating that when this lymphatic condition is well developed the prognosis should be guarded.

Lahey and Clute *(Boston Medical and Surgical Journal,* March 2, 1922) have investigated all the cases of cervical adenitis reporting at the Boston City Hospital for the five years from June, 1915, to March, 1920, and those occurring in Lahey's private practice. Of the number reported at the hospital they were able to follow but 46; 19 of these (to wit, 43.4 per cent) showed no further evidence of involved nodes, nor did they present any disabilities. Twelve cases (to wit, 26 per cent) exhibited palsy of the trapezius muscle resulting in a well-marked deformity, of which most of them complained; five cases showed palsy of the depressor angularis oris, resulting, from the surgeon's standpoint, in a disfigurement not particularly marked; two cases died following operation, one of pulmonary tuberculosis, the other of intestinal trouble. In eight cases there was persistence of nodes, two of them showing evidence of an active process benefited by *x*-ray treatment.

The authors believe that the question of treatment is not yet clearly laid down. They point out the importance of early treatment, particularly in the line of prevention —that is, proper attention to the teeth and tonsils. The *x*-ray, in case enlargement of the nodes be pronounced and persistent, seems to yield good results, nor should surgery be resorted to until a fair trial has been given to this treatment: to wit, it has been carried on for a period of six months to a year. Surgical intervention is indicated when the *x*-rays and hygenic and preventive measures do not stop a steady progression of the infection. This may rationally be confined to the removal of the larger nodes, the smaller ones being cared for by subsequent radiations. They have held that there still exists a type of extensive involvement which requires "bloc dissections," and they note that in cases in which successful effort has been made to preserve the spinal accessory it is still possible to have resultant palsy incident to handling this nerve.

An interesting feature of this report is that out of the 46 cases followed there were but two deaths, and only one directly traceable to pulmonary tuberculosis.

SHORT-CIRCUITING OPERATIONS.

Because of ease of performance, and, in many cases, promptness in relief, and where the indications for such an operation are clear and the method chosen is a sound one, and because of the permanence of good results, short-circuiting operations have been received by both surgeons and physicians with general approval.

Because of the tendency to report favorable cases promptly, there has been perhaps a belief in the efficacy of these operations not entirely justified by ultimate results. It has been pointed out many times by the leading surgeons that these operations are not in themselves entirely harmless, and if malapplied may lead to disastrous results. Moreover, a fairly definite technique must be followed if success is to be expected even when indications are present. It is obvious that patients who are successfully operated on, and are cured, do not of themselves report to doctors. Large numbers of these patients have been carefully traced and fully and publicly reported, proving how advisable the short-circuiting operation is when performed by skilled hands and under conditions calling for it.

Sprigg and Marxer *(Lancet,* April 15, 1922) approach the subject, which has been well traversed by the surgeons, from the medical standpoint and observe that in the past few years from 5 to 6 per cent of the

gastrointestinal cases applying for relief at Duff House have been those on whom short-circuitings have been done. They describe the cases of 64 consecutive patients; 51 of these had previously submitted to gastroenterostomy, 9 to partial colectomy, and 4 to ileosigmoidostomy.

Of the 51 gastroenterostomy cases the indications for the operation had been clear and proven in the great majority. Thirty-two of these cases were operated upon by leading surgeons of the day. Among these 32 are numbered 11 out of the 13 cases in which there was failure to prove organic lesion at operation.

Forty of the patients had operations performed more than five years before the period of report. In but one patient was this period less than two years. The authors' report includes this one because a second operation was called for and has been performed.

Complete examination was made of these patients, and they were subjected to careful medical treatment, with recovery in 14 cases and improvement in 17. Fourteen were subjected to further surgery, with 9 cures, 4 improvements, and one death.

The authors conclude that the outlook for patients who remain ill, or become ill with stomach symptoms after gastroenterostomy, is not as unfavorable as it is commonly regarded, and that medical treatment may at times be helpful or curative. Where this fails a second surgical operation is likely to be of service.

Of the five cases of ileosigmoiditis one of the operations was performed for indigestion and constipation. The symptoms recurred, but were cured by massage, diet, and rest. In one case the operation had been done for "hypogastric dragging, flatulence, pigmentation, mammary lumps, and clammy skin," without relief, excepting for the dragging. Medical treatment by massage, diet, rest and the correction of hyperacidity brought relief. The third case was operated on for colitis and loose bowels of five years' standing. Following operation there was persistent diarrhea which did not yield to medical treatment, nor was help given by a cecostomy and the flushing out of the colon. The ileum was then moved back to its original position. In the fourth case the operation was done for the relief of edema and melena; there was three years betterment. The patient showed on examination diverticulitis, which had been relieved by surgical means; health was restored by rest.

The case of ileosigmoidostomy and resection of the colon was operated on because of a diarrhea of ten years' standing. Four years later was subject to diarrhea, with blood and mucus in the stools. The lower bowel was ulcerated, with a tight constriction 1½ inches above the anus. This patient died two years later of cancer of the liver. Of the nine cases of resection of the colon operation had been done for constipation with neurasthenia, indigestion, or arthritis; indigestion with colitis or diarrhea; headaches and vomiting; pain ascribed to a kink; abdominal pain of uncertain nature; and obstruction by adhesion.

The authors state that "About half the patients who sought relief after gastroenterostomy recovered from their symptoms or improved greatly with lapse of time and suitable medical treatment."

In most of the remainder a detailed investigation showed abnormalities which are capable of relief by a further operation.

The conditions which call for a second operation are the persistent failure of medical treatment and inability of the patient to live a normal life; particularly if it can be demonstrated that bile is regularly in the stomach, or that the stoma is not in the lowest part causing accumulation of food between the stoma and the pylorus, or that the jejunal loops are not normal in appearance, or that there is dilatation of the duodenum and regurgitation of bile; or if there is evidence of ulceration in the neighborhood of the stoma, or of active ulceration of the stomach or duodenum.

Except for structural disease, short-circuiting operations upon the colon should not be performed unless suitable and persistent medical treatment has failed, and sound

scientific reasons can be put forward for believing that the operation will benefit the patient.

In all cases of chronic alimentary disease treatment, and especially operative treatment, should not be undertaken until the case has been investigated as thoroughly as the circumstances permit.

Progress in Therapeutics

Medical Therapeutics

The Prophylactic and Therapeutic Value of Pertussis Vaccine.

DAVIES, in the *American Journal of Diseases of Children* for May, 1922, states that of the 176 children exposed to the infection of pertussis 114 had not had the disease, twenty had had the disease, and the records and history were inadequate in forty-two cases. Thirty-three children developed the disease. Records in twenty-seven of these cases were negative for previous attacks and doubtful in the remaining six cases. Thirty-three children were admitted to the hospital ward with a positive diagnosis of pertussis, based in the majority of cases on the clinical findings. The remaining 143 children were given prophylactic doses of pertussis vaccine regardless of previous records or histories. He is quite sure that the majority of the children were exposed to the infection, and at a time when the disease was at the stage of greatest infectivity. Most of the children are very young, and since he feels that their histories and records are quite reliable, he would say that the majority had not had pertussis.

It has been stated that many persons possess an immunity against the disease, and it is possible that some of the girls possessed that immunity, but girls are said to be more susceptible to the disease than boys, also it has been noted that mental defectives very readily fall prey to infections of all kinds. If the disease was in its initial stages in any of the 143 cases in which prophylactic vaccine injections were given, it was evidently checked in its development, for no new cases were admitted to quarantine. If any of the cases persisted as mild or atypical cases, such as the first case was, the disease was not conveyed to any of the girls nor to the boys when the regular session of school opened in September and all children mingled as they do in the public schools.

Although it appears that the individual child responds differently to the pertussis vaccine, the duration of the disease is shortened by its administration. The duration in light uncomplicated cases is given as from eight to twelve weeks; the more severe cases last a longer period. Paroxysms were lessened in severity and duration, and whooping and vomiting were alleviated.

The most severe reactions occurred in children with valvular heart lesions.

Adrenalin in the Stokes-Adams Syndrome.

PHEAR and PARKINSON, in the *Lancet* of May 13, 1922, state that the experimental and therapeutic action of adrenalin upon the blood-pressure is well known, and the effect upon the heart itself is often considered only in relation to the vasoconstrictor effect. But adrenalin influences the heart both through the sympathetic and through the vagi. In animal experiments there is acceleration of the heart due to stimulation of the accelerator nerves in the heart muscle (the myoneural junction). A secondary

(or a relative) slowing of the heart may, however, occur, and this is due to excitation of the vagus center by the heightened blood-pressure. It is evident from the literature that the effect on the heart varies greatly with dose administered and with the mode of administration, whether subcutaneous or intravenous. In any case it is agreed that slowing does not occur if both vagi are cut; the main cardiac effect is sympathetic, there is acceleration of rate, and there is sometimes an alteration in conduction from auricle to ventricle.

Kahn, in 1909, recorded with the electrocardiograph complete heart-block produced in a dog by a maximal intravenous dose (0.1 mg.). Both auricular and ventricular rates were concurrently raised, so that no bradycardia resulted. In addition, aberrant ventricular complexes and frequent premature ventricular contractions were recorded. Cullis and Tribe, in studying the distribution of nerves in the heart of cats and rabbits, found the action of small doses of adrenalin almost identical before and after section of the bundle. There was acceleration with augmentation of the beat both of auricle and ventricle, showing that the ventricle is well supplied with sympathetic nerve-endings. Egmond, in dogs with experimental complete heart-block, found that acceleration of both auricle and ventricle resulted from intravenous injection of 0.1 cc suprarenin hydrochloride (Höchst). In one observation the ventricular rate increased from 30 to 45 a minute.

Routier produced complete heart-block in dogs by direct crushing of the A.-V. bundle, and then injected 1/20 mg. of adrenalin intravenously. The primary effect, in about twenty-five seconds, was acceleration of both chambers; and the secondary effect, twenty seconds later, was entire disappearance of the heart-block (déblocage) for twenty-five seconds. This effect was reproduced three times on the same animal. He refers it to stimulation of the sympathetic terminations in the A.-V. bundle, and noting that clinical cases of complete heart-block are recorded where unblocking spontaneously occurs, he suggests a trial of adrenalin in human heart-block. Hardoy and Houssay were unable to obtain experimentally the unblocking which Routier recorded. After an intravenous injection of 0.2 cc of adrenalin (P. D. & Co., 1 in 1000) into a dog with crushed A.-V. bundle, premature ventricular contractions appeared, and then both auricle and ventricle were accelerated, but without affecting the block. Similarly, Clerc and Pezzi failed to reestablish by adrenalin the normal rhythm in animals after section of the A.-V. bundle.

Experimental work, therefore, shows that adrenalin accelerates the ventricle as well as the auricle, even when complete heart-block is present. By a moderate dose Routier removed experimental block, and though this has not been confirmed by other workers, there is clinical evidence that it can occur. In patients with heart-block there are a few recorded observations on the effect of adrenalin. In Danielopolu's and Danulescu's case of complete heart-block the ventricular rate rose from 30 to 40 within twenty minutes after a subcutaneous injection of 1½ mg. of adrenalin, and from 26 to 45 within thirty minutes after 2 mg. The auricular rate also increased, though without relation to that of the ventricle, and no unblocking was observed. In their case of partial (2:1) heart-block, 1½ mg. subcutaneously reduced the degree of block so that only an occasional ventricular beat was dropped. At the same time both auricle and ventricle were accelerated, the original rate and ratio of A.-V.: 94: 47 becoming A. and V. 127. Numerous premature contractions, chiefly ventricular, were also produced (Roth).

In Hardoy and Houssay's clinical case with complete heart-block, a subcutaneous injection of 1 cc of adrenalin (P. D. & Co., 1 in 1000) had no effect either on the block or on the rate of the pulse. An intravenous injection of the same dose gave rise to disquieting symptoms with great acceleration of auricle and ventricle, yet without change in the block. Similarly, Lutembacher in a case of complete heart-block saw grave symptoms, including syncope, after an intravenous injection of 2 mg. of adrenalin

(Clin). In another patient with complete heart-block, an intravenous injection of 1/10 mg. was followed in sequence by premature ventricular contractions, ventricular tachycardia (Rothberger and Winterberg), and a ventricular pause with syncope. The pulse remained at 16 a minute for a week after this injection, one-half its original rate before any medication.

Arrilage obtained acceleration of both ventricle and auricle in six cases of complete heart-block by subcutaneous injection of 1 mg. of adrenalin, but no modification in block was observed on the electrocardiograms.

Strisower obtained a positive result in a man of 82 with complete heart-block. After a subcutaneous injection of 0.5 cc of adrenalin (1 in 1000), the ventricular rate rose from 28 to 84 in half an hour, and next day the electrocardiogram showed a normal rhythm. A month later, when 2:1 heart-block was present, a smaller dose (0.25 cc of 1-in-1000 adrenalin) doubled the ventricular rate and restored the normal rhythm, though only for a few minutes on this occasion. This author refers the effect to sympathetic stimulation, while suggesting that improved coronary circulation as a result of the adrenalin may also be a factor.

This clinical evidence shows that it is possible for partial block to be reduced, and for even complete heart-block to be abolished, by subcutaneous injection of adrenalin; though often it fails to modify conduction, as one might expect from the nature of the pathological lesion usually present in such cases. An increase in ventricular rate, however, is usually obtainable despite the block. This alone is a sufficient ground for an extended trial of adrenalin in Stokes-Adams attacks, where the immediate cause of the loss of consciousness is usually extreme ventricular slowing and standstill. In the case here recorded Phear and Parkinson are not in a position to state that any change in the complete block resulted, nor yet that the ordinary ventricular rate was accelerated. But the ventricular standstill determining the seizures was apparently abolished by its influence.

Rickets.

Lovett under the heading of "Progress in Pediatrics" in the *Boston Medical and Surgical Journal* of April 13, 1922, notes that the chemist and the roentgenologist can throw some light on the etiology and development of rickets. He quotes Finlay's conclusions that it is a disease of spring, that the relation between rickets and artificial feeding is not clearly proven, nor can the defective fat supply be rationally regarded as the causative factor. The rickety children usually are found in families where overcrowding and ill ventilation is common. Lovett further quotes numerous laboratory studies made on pups, rats, and babies, all tending to show that fat ratio, if a possible factor, is not the major one in producing the characteristic changes of the bones. He further quotes Hess's investigations upon winter milk fed to summer babies and summer milk fed to winter babies to determine whether the product of this milk had a bearing upon the development of this condition. None could be proven. Hess and Unger then proceeded to treat rickets with the ultraviolet rays on the basis that the sun must play an important part and that artificial actinic rays might be found serviceable, with results very conclusive.

Huldschinsky reported extraordinary results from the ultraviolet rays plus cod-liver oil plus calcium phosphate.

Hess and Unger checked their result with the Roentgen ray. They exposed the entire body, at first for three minutes and later for twenty minutes, three times a week, for two months. Definite improvement was shown in all cases—that is, a marked deposition of lime salts at the epiphyses. This seems to confirm the observations made recently that sunlight is highly beneficial, and also suggests the reason why negroes are particularly subject to this disease, the dark skin preventing penetration of the rays. Rats were placed on a rickety diet; one set was kept in darkness, and one was exposed to the sun fifteen to thirty minutes four to five days a week. The rats exposed to sunlight did not develop rickets.

Shipley, Park, Powers, McCollum and

Simmonds conducted similar experiments. One set of rats was kept in absolute darkness; another was taken out and exposed to direct sunlight fifteen to thirty minutes, four or five days a week. The diet was the same in both groups. Those subject to the sun rays did not show any signs of rickets; those kept in darkness did. They further note that the beneficent changes produced are similar to those produced by the use of cod-liver oil, and that "both contain something which is essential for optimal cellular function."

"Hess and Gutman found that rickets could be either prevented or brought about according to whether animals were subjected for a short period to the sun's rays or at all times kept in the dark. They believe that the ultraviolet rays play a large rôle in the curative power of the sun. They state that Howle and Kramer have found that the serum of infants with active rickets contains a diminished amount of inorganic phosphate, and that during the progress of healing, following the administration of cod-liver oil, the phosphate content gradually rises to the normal level. They exposed seven infants with rickets to direct sunlight from one-half to several hours daily, sometimes exposing only the arms and legs, at others the trunk also. The diet was unchanged. They did not trust entirely to the Roentgen rays to demonstrate the improvement which took place, as babies may have clinical signs of rickets and a low inorganic phosphate of the blood with normal bony contours of the wrists and elsewhere. The inorganic phosphate of the blood increased from month to month and gradually reached the normal level of about 4 milligrammes—that is, the results obtained were similar to those with cod-liver oil."

Lovett concludes his article as follows: "In spite of all the investigations detailed above as to the etiology of rickets, a very little knowledge of practical value for everyday use has been gained, although the outlook for the final solution of the problem is far brighter on account of this work than it was before. It has apparently been proved, as was previously supposed, that rickets is not due to a deficiency of calcium, and that it is useless, therefore, to give calcium salts in the treatment of this disease. It seems evident that rickets may develop as the result of poor environment or of some defect in the food; that is, there is a basis for both of the divergent views which have been so long held as to its origin. Lack of sunlight is apparently the most important if not the only element in poor environment. The etiological defect in the diet is apparently neither an excess nor a deficiency of any one of the food elements—fats, carbohydrates, or protein. It is evidently not a lack of vitamin A, but it is possible that there may be some relation between this vitamin and the real cause. A deficiency of phosphorus or an abnormal relation between the phosphorus and calcium may, perhaps, be the cause. It seems more probable, however, that the cause may be a deficiency of some unknown factor or factors, which stimulate or regulate the metabolic processes especially concerned with the salts of calcium and phosphorus.

"These recent investigations have shown that there is a real basis for the empirical teachings of the past that out-of-doors, phosphorus and cod-liver oil were of use in the treatment of rickets. They leave us somewhat in the dark, however, as to how to prevent it. It would seem, sunlight being beneficial only when it strikes directly on the body, as if it was not sufficient to keep babies in airy, sunny houses, but that their naked bodies must be wholly or partly exposed to the sun's rays. It will be rather difficult to persuade the average mother to do this regularly in the winter as a preventive, although she will probably do it gladly as a curative measure. These investigations show us little or nothing as to how a baby should be fed to prevent the appearance of rickets. It still seems safe, however, to follow the old teachings that human milk is the best food for babies, and, next to it, some modification of cow's milk. It may be that the time will come when all babies will be given cod-liver oil as a preventive.

It seems evident, at any rate, that cod-liver oil will cure rickets. As it is the easiest and simplest method, it would seem to be the one of election. Phosphorus also seems to have a definite curative action. Phosphorus is, however, a dangerous drug and the limits of its dosage narrow. It is therefore inferior to cod-liver oil for ordinary use."

Syphilis of the Heart and Aorta.

WILTSHIRE, in the *West London Medical Journal* for April, 1922, states that the general treatment and management of heart failure due to syphilis are exactly the same as for heart failure due to any other cause. In the attack against the syphilis itself, however, it is well to remember that salvarsan injections are not free from danger when the heart and aorta are affected. An injection may be followed by an acute exacerbation of inflammation in any syphilitic focus, just as an injection of old tuberculin may provoke an intense reaction in a tuberculous lesion. If, as is so often the case, the coronary arteries happen to be involved in the syphilitic process, an injection may precipitate an anginal attack, or sudden death. In consequence it is wise, if salvarsan be given, to take precautions by administering a previous course of iodide and mercury, by keeping the patient in bed for the injection, and by starting with a small dose—for instance, 0.1 grm.—and by increasing the dose very gradually.

The prognosis of syphilis of the heart and aorta, as it is seen in clinical practice, is very bad indeed, and this for three reasons:

1. The vital importance of the parts involved.

2. The fact that patients do not seek help, or are not diagnosed, until changes are far advanced.

3. The fact that treatment, though it may vanquish the syphilis and so retard the rot, cannot restore these vital tissues to that original form which is essential for their proper function. Fibrous tissue cannot act as muscle or elastic tissue, and a sclerosed vessel cannot deliver a full ration.

The figures given for sudden death show that the immediate prognosis must always be anxious, and the remote prognosis is gloomy, for patients do not often survive diagnosis by more than three years. Deneke watched a series of 140 cases from the time they were first diagnosed, and found that about half lived one year, about two-thirds lived two years, and only about one-fifth survived three years.

The prognosis, then, is about as anxious and as gloomy as it well could be, and a clinical diagnosis of late syphilis of the heart and aorta is the practical equivalent of a death sentence. It is obvious that until we can attain to that ideal, the total prevention of syphilis, we must concentrate upon full and thorough treatment in the earlier stages of the disease, since these may provide the last opportunity to save the life of the patient.

The Curative Treatment of the Main Causes of Maternal Mortality.

TRACY-INGLIS, in the *New Zealand Medical Journal* for April, 1922, reminds us that in view of the very great importance of the early treatment of puerperal sepsis all rises of temperature in the puerperium should be accounted as due to this cause unless there is good proof to the contrary. The prognosis of puerperal sepsis bears a definite relation to the period at which active treatment is begun, and cases vigorously dealt with at the onset usually recover. There is, however, a natural tendency on the part of the obstetrician to hope that the symptoms are due to a lesser cause and to endeavor to formulate some other theory for their occurrence. It is thus that one frequently sees many days wasted on the assumption that the pyrexia is due to influenza, constipation, painful breasts, etc., etc. In this way the time is lost when a uterine exploration would be very beneficial.

In his opinion it is not only useless but dangerous to explore or curette in any way the uterus after the pyrexia has been established four or five days. The worst cases

of puerperal sepsis he has seen are those in which curettage with a blunt curette and intrauterine douching have been carried out about the ninth or tenth day, pyrexia having been present from five to six days, the obstetrician putting off the evil hour from day to day, hoping the temperature would go down. An unbiased observer would at once diagnose puerperal sepsis.

The first thing to do in an early case of puerperal sepsis is to explore the uterus, preferably under an anesthetic. This is contraindicated in cases in which one knows from uterine exploration at the time of the confinement that the uterus is perfectly empty and in which there are suppurating perineal or vaginal lacerations. In these cases the uterus is firm, normally involuted, and not tender, and so it is justifiable to first try what treatment of the obvious lesion will do. In many cases, however, there are no sure means of ascertaining whether the uterus is or is not infected, and so it is safer to assume that it may be, as irreparable ill may result from delay.

The uterine cavity should be explored with the gloved fingers and any placental débris, etc., removed. In these early cases he sometimes uses a large, fairly sharp curette, and he has found this particularly useful in cases in which the placenta has been adherent, and in cases of polypoid decidual endometritis. Curettage is followed by careful swabbing with iodine. This exploration is followed by an intrauterine irrigation with a suitable antiseptic solution such as iodine, lysol, or biniodide of mercury. He has a preference for Milton fluid, which is a powerful and stable hypochlorous acid preparation. He uses a 1-in-10 solution for the first intrauterine irrigation, and afterwards a 1-in-30, as the stronger solution is apt to irritate the skin of the vulva.

In many instances there is an immediate fall of temperature; in other cases the improvement is more gradual. Occasionally the operation is followed by an abrupt rise of temperature, and possibly a rigor. This rise is, however, merely temporary, and is followed in most instances by a rapid fall.

If such treatment is delayed, or if in spite of such treatment the pyrexia continues, it is advisable to provide for more efficient drainage by inserting a tube into the uterus. He uses a double tube fixed to the cervix with a stitch, and with this in position the uterus not only drains well, but can be irrigated frequently without much discomfort to the patient. After exploring the uterus the patient is put to bed in Fowler's position and frequent vaginal douches given.

If treatment has been delayed and the infection becomes generalized, he has had most success with intravenous injections of eusol (60-70 cc followed by saline).

In these cases it is well to obtain an autogenous vaccine as soon as possible, and while this is being prepared he usually gives a dose or two of a stock streptococcic vaccine, or sometimes a mixed streptococcic and staphylococcic vaccine. He has had no experience of the intravenous injection of arsenobenzol as advised by Miller and Chelfant, nor has he tried the intravenous injections of a 2-per-cent solution of magnesium sulphate as recommended by Harras.

Many years ago (in 1903) in a very desperate case he tried a fixation abscess, which treatment proved successful. It is interesting to note that in this case after the fixation abscess had been opened four days a pelvic abscess formed; this was evacuated, and the patient made a good recovery. This patient was the worst case he has ever seen that eventually recovered.

As a routine treatment in these cases he always uses rectal injections of five-per-cent glucose in saline solution.

With regard to internal medication, he uses a mixture of quinine, ergot, and digitalis, administered three times a day. If the patient is restless and complaining of pain, headache, or sleeplessness, he finds a powder containing Dover's powder, veronal and acid acetylsalicyl very useful. He has also found intramuscular injection of 0.5 cc of posterior pituitary extract every night and morning useful in cases with a low blood-pressure. On some cases it becomes necessary to perform major operations, especially ligature or removal of veins in puerperal thrombophlebitis. He

has performed this operation in one case, but the diagnosis of thrombophlebitis in this case was comparatively easy, and the operation was performed in good time and with good results.

In these cases the possibility of hysterectomy must be considered, and where there is extensive thrombophlebitis and infection of the uterine appendages he thinks hysterectomy is indicated. The only case in which he has performed hysterectomy for puerperal infection was one in which the patient had a sloughing fibroid.

Pelvic abscesses should be opened per vagina or just above Poupart's ligament. In some indefinite cases which are not doing well drainage of the peritoneal cavity by a vaginal incision through the uterorectal pouch is sometimes indicated.

Indications for the Simple Mastoid Operation.

MacCuen Smith, in a paper recently read before the Section of Otology of the College of Physicians of Philadelphia, an abstract of which is published in the *Weekly Roster and Medical Digest* of May 27, 1922, states it is reasonable to assume that in every tympanic abscess we have coincidentally a similar involvement of the mastoid antrum. Once the antrum is involved, it becomes a progressive mechanical process. So long as the aditus remains patulous, drainage will be ample and carious erosion is not likely to ensue. When this drainage is interfered with, however, inflammatory products find their way, under pressure, to the various mastoid cells. Erosion soon takes place, if the cortex is more or less spongy, as is found particularly in children, and an opening through it is soon made, providing for the escape of pus between the periosteum and bone, producing the classical symptoms of mastoiditis. If, on the other hand, the cortex is eburnated or sclerotic, the extending erosion will follow the line of least resistance, which may involve the sinus, dura, or labyrinth, with the various complications incident thereto; or the pus may burrow through the tip, producing Bezold's variety of mastoiditis, which would bring about a cessation of subjective symptoms. In this latter group, unfortunately, diagnostic symptoms sometimes develop so slowly that the disease may be far advanced before recognition is possible. This is especially true in some cases of otitic meningitis.

A familiar point, therefore, that he would emphasize, and one very frequently overlooked by the profession, is the relative simplicity of a frank case of mastoiditis, quickly producing the classical symptoms, in comparison with the grave type of disease that does not cause typical symptoms from the fact that its direction is inward, its development frequently being masked until the symptoms of one of the serious complications arouse one to the gravity of the situation. Surely the day is long since past when modern otology will sanction the practice of waiting for the development of the classical symptoms of mastoiditis, or until the onset of complications, before resort is had to surgical intervention.

Fever, even though slight, is a very constant symptom of mastoiditis, and when accompanied by some tenderness and a small perforation at the summit of the bulging membrana tympani which closes after repeated incisions, operation is indicated.

If at the end of the fourth or fifth week there is an abundant purulent, creamy discharge, even in the absence of fever and pain, the mastoid operation is indicated.

A profuse suppuration, especially if streaked with blood or brownish-yellow in character, extending over the same length of time, or longer, is an indication of mastoid necrosis requiring an operation.

Drooping of the superior and posterior wall is one of our most valuable findings and indications in operative mastoiditis. In this connection it should be remembered that this sagging of the posterior wall occurs only when the antrum is definitely involved. Hence if the disease is confined largely to the middle and lower cells, the indications for operation may be just as urgent, even in the absence of a drooping posterior wall.

Even though the mastoid process may be painless and otherwise normal in appearance, yet in the presence of a discharge, though slight, from the external auditory canal, and fever, headache, and a persistently unsatisfactory general condition, due to absorption, a mastoid operation is indicated.

It is well to remember that most children are very susceptible to inflammatory reactions, especially, perhaps, under the influence of confined secretion, pus or otherwise, within the tympanic cavity. Under such circumstances it is not uncommon for children to present a meningeal syndrome characterized by high fever, convulsions, and more or less stupor. These patients will have some degree of the characteristic primary mastoid pain, and yet the mastoid *per se* may be very slightly involved. Timely evacuation of the tympanic secretion by means of a free incision of the membrana tympani will promptly relieve the above symptoms, in the absence of additional inflammatory extension.

The mastoid operation is imperative when intracranial lesions, such as meningitis, cerebral or cerebellar abscess, sinus thrombosis or facial palsy, are threatened or present.

A continuation of fever after the establishment of free drainage is a danger sign and usually requires operation. On the other hand, absence of fever following a free discharge is not a definite indication that the mastoid may not have to be opened. This is particularly true in sclerotic mastoiditis.

A sudden cessation of tympanic discharge, the membrana tympani being perforated, in the presence of fever, pain, etc., or the subsequent development of these symptoms, is a bad omen and requires mastoidectomy.

In the absence of threatening symptoms it is best, in the majority of cases, to wait for the process of walling off before operating.

Tenderness over the emissary vein is a danger-signal and should be given very careful consideration on account of its potential gravity in many instances.

Blood examinations, as well as bacteriological findings, will assist in determining the severity and progress of the disease, more especially if complications supervene.

Acute suppurative disease complicating the exanthemata requires early operative intervention in the average case, if we hope to prevent subsequent chronic otorrhea, destruction of the membrana tympani, and future complications.

The *x*-ray is valuable in a fair percentage of cases in pointing out the position of the sinus, and, in a much smaller percentage, by determining the bone involvement.

Excess Protein and Mammary Secretion.

In an editorial on this subject in the *Journal of Laboratory and Clinical Medicine* for May, 1922, it is stated that Hartwell, on evidence which is not altogether free from criticism, holds that lactating animals should not have too much protein in their food. By too much protein she seems to imply that more than thirty-three per cent of the dry food is protein, and thinks that on such a food the nursing young are likely to die. Her experiments were made on rats, and the excess of protein was provided for by the addition to the food of edestin, blood and egg albumen, gelatin, and home-made gluten. Such dietaries apparently rendered the milk poisonous and finally checked its flow. The toxicity of the mother's milk is demonstrated by the development of spasms in the young. The cessation of the flow of milk is shown by the loss in weight of the young and the emptiness of their alimentary tracts after death. The mother is likely to put on weight at the very time the young are developing spasms and dying. Much has been said and written about an excess of protein in our food, and physiologists have been divided on this point, some claiming that ordinarily we eat too much protein.

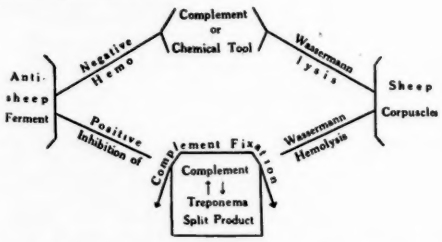
Chittenden has been the most forceful advocate of a low protein diet. So far as we know, the experience of all armies in the World War fails to show that any harm came to any one from an excess of protein in his food, while it is shown that

much harm came to many on account of too little protein in the food. We are told that too little protein in the food is the cause, or at least is a factor in the causation, of pellagra, and possibly of other deficiency diseases. Now comes Hartwell, who tells us that too much protein in the food is bad during lactation. It does no harm to the mother, but it kills the young. We are not convinced by Hartwell's evidence. She herself seems somewhat in doubt about it. Having used commercially prepared proteins in order to make the food excessive in this constituent, she admits that these commercial products may have been denatured in some way, and that this may account for her results. She is also conscious of the fact that her dietaries were deficient in fat and in vitamins, and possibly the harm to the babies might have come from this cause rather than from an excess of protein in their food. At least, this is a matter which needs further investigation. So long as proteins in the food are split up into amino acids in the small intestine, none of which are poisonous and all of which in excess are rapidly eliminated, we must, for the present at least, decline to accept Hartwell's conclusion.

A Graphic Explanation of the Wassermann Reaction.

HERB, in the *Illinois Medical Journal* for May, 1922, states that the days when the Wassermann reaction was a blank mystery have passed. We have advanced at least so far that the basic principles involved in this reaction have become clear and transparent. These basic principles constitute the landmarks given in the diagram. The infinite and laborious technical details, that make the Wassermann reaction the cumbersome task it still is to-day, are not touched upon, as they do not concern the general practitioner.

There are two circuits in the diagram, an upper and a lower. The upper circuit represents the negative reaction. In the laboratory this negative reaction is indicated by the dissolution of the sheep corpuscles used in the test and the reddening of the fluid in consequence of the diffusion of hemoglobin. The lower circuit represents the positive reaction. In the laboratory this positive reaction is indicated by the fact that the sheep corpuscles remain undissolved. The hemoglobin does not diffuse and the fluid does not redden.



In the upper circuit, or negative reaction, three factors are involved: (1) the amboceptor, or specific sheep corpuscle dissolving ferment; (2) the complement; (3) the washed sheep corpuscles. All three factors and their biologic reactions are well known.

First, the amboceptor or specific sheep corpuscle dissolving ferments. We produce these ferments by using the well-known fact that any albuminous substance, when injected into an animal body, calls forth the development of specific ferments that are capable of digesting, or disintegrating, the injected albumin. Thus, if sheep corpuscles are injected into a guinea-pig, the pig develops specific ferments that are capable of disintegrating sheep corpuscles, whether within the guinea-pig or in the test-tube. These specific ferments are called amboceptor or specific antisheep ferments.

Second, the complement. This, too, is a well-known factor. The discovery of Bordet, of France, that ferments cannot be active except in the presence of another substance, known in America as "complement," is now everywhere accepted as an indisputable fact. This complement is to the ferment what the mechanical tools are to the carpenter. As the carpenter is unable to fashion his lumber without his tools, so the ferment is unable to do its work without complement. He has, therefore, elsewhere designated the complement as the chemical tool of the ferment. This designation of the

complement will help much to add to the understanding of the Wassermann reaction, as expressed in the diagram.

A simple and well-known example may serve as an illustration. Pepsin is a ferment and hydrochloric acid is its complement, or chemical tool. Pepsin plus hydrochloric acid will digest casein, but if we take away the acid, pepsin becomes incapable of action, as does the carpenter who cannot fashion his lumber if he loses his tools.

The chemical composition of complement is different for different ferments. However, it is always of the nature of a simple inorganic compound. In the case of pepsin we know it to be hydrochloric acid. With rennin it is probably a calcium compound. In the case of blood ferments the nature of complement is the same. There is ample proof, for example, that in some instances at least, as with precipitins, it is as simple as sodium chloride, or common table salt.

The meaning of the upper circuit of the diagram seems now sufficiently plain. If placed together into a test-tube, the antisheep ferment will, with the aid of its chemical tool (complement), disintegrate the sheep corpuscles, and thus, by liberating hemoglobin, tint the fluid red. Therefore the reddening of the fluid is the visible sign, or indicator, that nothing interfered with the biologic reaction.

This upper circuit represents also the negative Wassermann reaction in so far as the normal, non-syphilitic blood, if added to the above mixture, does not interfere with the complement, and the reaction runs its course as if no blood had been added. In other words, the reddening of the fluid by the diffusing hemoglobin is the indicator that the added human blood contains nothing to rob the antisheep ferment of its chemical tool or, to use the medical vernacular, to unite with or "fix" the complement.

However, if the blood of a syphilitic person is added to the above mixture—specific antisheep ferment plus complement plus sheep corpuscles—the complement is destroyed by the syphilitic complement fixing substance contained in syphilitic blood. The ferment, thus robbed of its chemical tool, can no longer disintegrate the sheep corpuscles and the hemoglobin is not diffused. Thus, the non-reddening of the fluid is the visible indicator that the syphilitic, complement fixing substance is in the blood and, by robbing the ferment of its chemical tool, prevents the dissolution of the sheep corpuscles.

This union of the complement with the syphilitic, complement fixing substance is shown in the lower circuit.

The syphilitic, complement fixing substance is a digestive split product of the treponema, and is formed during the parenteral digestion of dead syphilitic germs.

The only factor that remains uncertain as to the rôle it plays in the Wassermann reaction is the so-called "antigen." It is not shown in the diagram so as to simplify the sketch and to avoid confusion. Its purpose is probably mechanical rather than chemical.

Treatment of Hemorrhage Following Tooth Extraction.

In an editorial on this subject in the *Lancet* of May 20, 1922, it is stated that hemorrhage after the extraction of teeth may be serious, and since the patient may not take alarm until several hours have elapsed, it often becomes the duty of the nearest available doctor to treat the case. Plugging the socket, providing it be accurately applied, will generally suffice but may not be easy, and many styptics have been recommended as an adjuvant. Some of these, for example ferric chloride, give rise to subsequent sloughing, which more than outweighs their hemostatic action, and are therefore to be condemned; others, like adrenalin, are so quickly diluted by saliva or blood that they become ineffective. Steadmen, in an interesting paper read before the Section of Odontology of the Royal Society of Medicine, and published in the *British Dental Journal* of April 1, advocated the use of oil of turpentine and states that over an experience of twelve years he has not known it to fail. The method of application is simple. The gauze

is soaked in the drug and the socket packed; if necessary it is kept in place by stitching or by applying a pad over the gum and bandaging the jaws.

Steadmen gives notes of four cases in which the hemorrhage was severe. The patients were all women, and in each there was a history of a liability to bleeding; the father of one patient had died from hemorrhage. The teeth were removed at intervals with great care, and all went well until a canine was extracted. This bled profusely for several hours. The socket was syringed with cold water and packed with gauze soaked in oil of turpentine, and the bleeding ceased immediately. Another patient, a woman of thirty, gave a family history of a mother with a tendency to bleed, the patient's son died of hemorrhage after circumcision at the age of four, and her daughter also had hemophiliac tendencies. Several teeth were extracted without any bleeding, but profuse hemorrhage followed the removal of a molar. In this case it was necessary to pack the socket on three occasions before the bleeding was finally controlled. Steadmen remarks that although they were not true hemophiliacs, yet there was an abnormal tendency to bleed in each case, so that the test of the efficacy of turpentine as a local hemostatic was severe.

In each of these cases calcium lactate had been given previously, but in the majority of his cases calcium lactate was not given as the bleeding was unexpected. Steadmen adds that oil of turpentine is a powerful antiseptic, and that after the plug is removed the sockets retain a faint smell of turpentine and are clean and free from infection. This is in striking contrast to the usual experience after plugging, when the socket is generally septic and takes a long time to heal.

Oil of turpentine would appear to possess definite advantages over most other methods of dealing with hemorrhage of dental origin, though in the *British Dental Journal* for March, 1920, a case was reported in which death resulted eight days after the removal of three teeth; turpentine was used locally as advised by Steadmen, but even with transfusion of blood failed to save the patient. Steadmen does not claim to have originated the use of oil of turpentine. It is, in fact, a very old method which has dropped out of recognition, although it still has an oral currency among older practitioners. Salter, in 1874, quoted John Hunter as advocating its use after dental hemorrhage, and there can be no doubt that it has proved a useful addition to the list of reliable local hemostatics.

The Therapeutic Value of Quinidine Sulphate in Auricular Fibrillation.

The *British Medical Journal* of May 20, 1922, in its "Reports of Societies," refers to a paper by Ritchie on this topic, briefly alluding to the literature of the subject since the publication of papers by Frey in 1918. In over 200 reported cases of auricular fibrillation restoration of the normal rhythm after use of quinidine sulphate had been claimed in 57 per cent. High claims had been made for the drug, and it was alleged to obviate the necessity of continuing digitalis. Ritchie presented a personal study of twelve cases in which quinidine had been tried and its effects observed. Of the twelve, eight were men and four women; they included eight cases of mitral valvular disease (a majority rheumatic), one exophthalmic goitre, one melancholia, one syphilitic myocarditis. The results had been permanent restoration of the normal rhythm in one case; for a considerable period in one; a transient restoration in one. Fibrillation had been replaced by flutter in one case, while the drug had failed to affect the rhythm in eight of the twelve cases. From the point of view of symptoms and general condition only two cases experienced benefit. The usual dosage had been employed, 0.4 gramme thrice daily, with an initial smaller dosage. The number of cases was small, but the results were not encouraging and did not support the high claims advanced for the drug. He had failed to get indications as to types of cases more suitable than others for quinidine sulphate. But if the drug succeeded

in a particular case it would again be successful if auricular fibrillation were resumed. He had met with unpleasant results in its use; it might increase the ventricular rate, and, if so, should be combined with digitalis; it also might set up multiple ventricular extra-systoles; and there was also some danger of embolism from dislodged clot in the auricles. He considered that quinidine should not be used in cases in which there were such signs of cardiac failure as dilatation of the heart, dropsy, or cyanosis. The action of quinidine on the heart might be considered, in relation to Lewis's theory of circus action of the auricles in fibrillation, as a lengthening of the refractory period of the auricle; but there was no evidence that it could modify or remove the inflammatory or degenerative changes in the ventricular walls that were present in these cases. The disappointing results of the drug were probably due to the confinement of its influence to the abnormal auricular function.

D. Murray Lyon confirmed these observations from his experience of quinidine sulphate in seven cases. When given without digitalis it seemed to have a toxic action on the ventricle, and it was advisable to employ digitalis before it or along with it. It was not a safe drug to use unless its effects were carefully controlled by the electrocardiograph or the polygraph.

Treatment of Hyperemesis Gravidarum by the Duodenal Tube.

PADDOCK, in the *Journal of the American Medical Association* of May 27, 1922, states that by the applied use of the duodenal tube in early stages of hyperemesis gravidarum the necessity for emptying the uterus for this disturbance may be reduced to a minimum. This method of treatment not only relieves the concern about the loss of the mother's life, but secures the life of the fetus as well.

While, in the treatment, the passing of the tube is comparatively simple, still, to insure the best and quickest results, the coöperation of the patient with the physician is necessary. After the tube has settled into place, that is in from four to twenty-four hours, the rest of the cure is simple.

As he sees it now, the principal indications for the use of the tube are the loss of weight (due to starvation) or the dehydration of the tissues—in other words, the depleted condition that arises from excessive vomiting, or hyperemesis gravidarum.

Local Anesthesia, Especially in Tonsillectomies.

CAMPBELL, in the *Ohio State Medical Journal* for June, 1922, states that his experience with stovaine has been too limited for him to presume to pass judgment upon it, but he claims that cocaine hydrochloride in 0.5-per-cent solution, using an ounce or less to the patient, as in a tonsillectomy, will produce no constitutional reaction in 75 per cent of the cases; of the remaining about 20 per cent will show cocaine reactions, and 5 per cent true cocaine poisoning. If a 0.6-per-cent solution is used the susceptibility will rapidly increase; whereas with a 0.4-per-cent solution the reaction will just as rapidly decrease. However, it has been reported that a 0.01-per-cent solution has produced cocaine poisoning of an alarming nature. Absolute anesthesia is usually produced by a 0.4-per-cent solution. Apothesine in 0.5-per-cent solution, if not more than an ounce is used to the patient, is non-toxic. He has not had occasion to use stronger solutions than this. However, reliable reports of the injection of much larger quantities than this also show uniformly good results without toxic symptoms. Solutions weaker than 0.5 per cent can also be used and with satisfactory anesthesia. Apothesine induces anesthesia rapidly, in less than five minutes, but the absolute anesthesia cannot be depended upon for a longer time than fifteen minutes, although in many cases (and in certain operations) anesthesia of a good grade will last considerably longer.

Quinine-urea hydrochloride has deservedly fallen into disrepute because of the

postoperative reaction it produces upon the tissue in the nature of sloughing and tardy granulation. A 0.5-per-cent solution is non-toxic in ounce quantities for tonsillectomies and requires fifteen to thirty minutes for anesthesia. The anesthesia thus obtained is absolute and lasts several hours, the effect gradually passing off. The duration of the anesthesia is the drug's only advantage, but this is more than counterbalanced by the retardation of tissue repair. In other specialties it is used in much stronger solutions with success and without toxic symptoms.

Procaine (novocaine) in 0.5-per-cent solution, an ounce to the patient for tonsillectomy, is non-toxic. Absolute anesthesia begins in from seven to ten minutes, lasts at least thirty minutes, and is usually entirely satisfactory. A 1-per-cent solution may be used with the same safety as the 0.5-per-cent solution in an ounce quantity. Compared to cocaine of equal strength and quantity, procaine may be used with far greater safety, but the anesthsia is not so pronounced. Apothesine and procaine are at present the safest and deservedly the most popular local anesthetics.

The clinical dangers arise more from idiosyncrasies or the method of injection than from the local anesthetic itself. A recent survey of the causes of toxicity from local anesthesia, as used by laryngologists, brought forth the information that one of the more frequent causes was the injection of the wrong concentration or the wrong drug or both. That is, instead of injecting a 0.5-per-cent solution of cocaine, an injection of 5 per cent or stronger solution was given, some cases resulting in death. The toxicity of the solution was also influenced by the rate of injecting. For this reason the solution should not be injected rapidly with a large-bore needle, but with a small-bore needle with a slow injection, for it must be remembered that there is a possibility of entering a vessel and placing the solution directly into the circulation.

The addition of adrenalin chloride enhances the anesthetic action as well as the vasomotor constriction, and slows the time of absorption, thus reducing the toxicity, whatever anesthetic solution is used. An excessive quantity of the adrenalin produces cardiac and vascular symptoms. Consequently its use should be guarded in patients having cardiovascular-renal abnormalities.

The technique of injecting is of the utmost importance in tonsillectomies, as in operations on the nose and throat. The alleged advantages of infiltrating the pillars, tonsil parenchyma and various parts of the soft palate have not stood the test of time. The edematization of the fauces thus brought on is unnecessary, if not harmful, for the absence of the old landmarks and the innovation of others tend to make dissection slower and more difficult. Patience, gentleness and care when injecting make impossible any unpleasant symptoms, such as pain and roaring in the ears when force and haste are used.

He summarizes his article as follows:

1. Absolute anesthesia can be obtained by local anesthesia.

2. Local anesthesia is safer than general in the vast majority of cases.

3. If local anesthesia is good for a *bad risk* it is equally good for a *good risk*.

4. Local anesthesia requires a more finished technique than general anesthesia.

5. Local anesthesia for tonsillectomy in children is often an advantage.

6. The psychic factor is of great importance in local anesthesia.

The Carbon Arc Light in the Prevention and Cure of Rickets.

HESS and UNGER, in the *Journal of the American Medical Association* of May 27, 1922, state that the carbon arc lamp has been found, in the laboratory as well as in the clinic, to be a very effective therapeutic agent in the prevention and cure of rickets. It has the advantage of being comparatively inexpensive, and its rays are non-irritating to the skin, so that it can be used for hours with perfect safety. There can be little doubt that, in the near future, rickets clinics will be established in our larger cities, where not only cod-liver oil will be

supplied, as suggested and carried out in New York some years ago, but also heliotherapy will be practiced. It would seem that in such clinics or in child-caring institutions, lamps of this kind may prove serviceable during the winter and spring months for protective therapy for groups of children. Such treatment would be of especial value for negro infants; for it is evident that if these babies—whose skin tends to filter out the essential rays of the sun—are to thrive in the cities of the temperate zone, they must be provided with a greater abundance of effective light than white infants.

The Therapeutic Value of Quinidine.

LEWIS, in the *American Journal of the Medical Sciences* for June, 1922, states that the percentage of cases in which quinidine, as it is used at the present time, will restore the normal rhythm in the fibrillating auricles is approximately 50 per cent. With these figures, drawn from previous records, the experience of his own clinic agrees. The figure applies to chronic fibrillation of the auricles.

When in a case of auricular fibrillation the normal rhythm is restored, the gain to the patient is considerable. It is not so apparent while the patient lies in bed, for in the cases most suitable for treatment there are few or no symptoms at rest. It is when the patient goes about again and undertakes his daily duties that he feels real benefit; and the benefit is chiefly due to the heart being once more under strict nervous control. In particular, exercise no longer raises the rate to levels which are incompatible with comfort or which produce actual distress. The change brings similar benefits to the heart as does the lowering of ventricular rate by digitalis; quinidine has the advantage, however, in patients in whom its effects are permanent, in that it frees them from further drug treatment. In treatment by digitalis the drug has to be maintained, in most cases indefinitely.

Nevertheless, the usefulness of the drug from the clinical standpoint is limited. It is limited by the high percentage of failures (50 per cent) to restore the normal rhythm. Too much emphasis should not be laid upon these failures however, for it seems probable that the percentage will be reduced as further experience is gathered.

It is limited also by its unsuitability in cases of venous stasis. But the chief limitation is more serious and consists in the early and very frequent resumption of auricular fibrillation. In not a few patients the restored normal rhythm lasts but a few days or a week, and fibrillation returns again and again after successive periods of treatment. In others the normal rhythm is maintained for a few weeks or months; a few cases have been observed in which it has been maintained for six months or a year. In the last group it must be judged an unqualified success, but in proportion as from case to case the return of fibrillation is less delayed, so the remedy becomes less practicable as a remedy. The value of quinidine has so far been greater in adding to our knowledge of fibrillation of the auricles than it has been in therapeutics. It has taught us many important facts, and among the most notable is that the hearts which display chronic auricular fibrillation are capable of beating normally, a quality hitherto in doubt. It has also taught us that the cause which predisposes to fibrillation, or at first initiates fibrillation, is maintaned in the chronic state.

Although it seems clear both from experimental and clinical observation that fibrillation once established tends to maintain itself, it is no longer possible to accept the conclusion that once established it will perpetuate itself indefinitely, though its original cause is removed. The pronounced tendency for the disorder to recur is opposed to any such conclusion; it teaches us that we have still to seek the ultimate causes of the disorder and that the prospect of fully successful treatment is along those lines of investigation.

As in earlier publications, Lewis and his collaborators still deprecate the general use of the drug. At the present stage of

investigation it should be employed only under strictly controlled conditions; it is a treatment emphatically for the wards rather than for use in an out-patient department.

The Influence of Rigid Salt Restriction in the Diet of Chronic Nephritis.

In the *American Journal of the Medical Sciences* for June, 1922, McLESTER states that a year ago Allen reported his observations upon the influence of salt-restriction in the diet of patients with chronic nephritis and so-called essential vascular hypertension. He stated that the measures usually attempted were ineffective because inadequate, and that rigid chloride restriction, as nearly absolute as possible, would achieve genuine benefits. He reported that following such withdrawal of salt from the dietary he has regularly seen a material fall in the blood-pressure. Among other beneficial effects he also saw improvement in the retinitis and other eye changes of nephritis. I recall his interesting speculation that we may in time come to conclude that sodium chloride is the long-sought-for poison of uremia.

It is generally recognized that the excessive use of salt is harmful, and that its restriction in nephritis is to be recommended; but McLester has not been able by chloride restriction as ordinarily practiced to produce results comparable with those of Allen. Following, then, Allen's suggestion that our restriction of the past has not been sufficiently rigid, he has studied in a small number of hypertension patients over a limited period of time the effect of the almost absolute elimination from the diet of all chlorides. Because the patient frequently complained that this diet produced an intense weakness, it was necessary to limit the length of such observations; and because of the many pitfalls which surround attempts at accurate clinical control of intake and output, the final number of patients upon whom he can report was reduced to ten.

Note was made of the influence of this diet upon the patient's general condition, his blood-pressure, any possible eye changes, and certain chemical bodies of his blood. The chloride content of the urine was used as a check upon the accuracy with which the dietary restriction was observed.

Distinction is made in these charts between the salt-poor and the salt-free diets, the latter, of course, being a relative term. With the salt-poor form the patient was given the usual low-calorie nephritis diet with no addition of salt to the food after it reached the table. It is estimated that thus the patient received daily the equivalent of about 2 gms. of sodium chloride. For the salt-free diet the bread and all other foods were cooked without salt, and the patient received only such an amount of chlorides as was present in the native foodstuffs. It is estimated that upon this diet the patient received daily the equivalent of less than 1 gm. of sodium chloride. One or two weeks upon the salt-free diet with a variable interim of salt-poor food, and then a second salt-free period, was the rule, although one patient was able to maintain the more rigid diet for a continuous period of sixty-four days.

To summarize, the following results of the salt-free diet were noted:

1. The patient found the food unappetizing and usually ate but little. This factor cannot be disregarded.

2. The blood urea instead of decreasing showed a tendency to increase.

3. The blood chlorides, irrespective of diet, varied but little; while the urine chlorides, reflecting the degree of the patient's adherence to the diet, fell to a very low figure.

4. The systolic pressure, as a rule, showed a moderate fall. This fall was never marked.

5. In two of the patients there developed weakness and prostration to a distressing degree.

6. One of the patients suddenly experienced retinal hemorrhages and other fundus changes at the end of two weeks of this diet.

From these limited observations he concludes that the almost complete elimination of chlorides from the diet of patients with nephritis and vascular hypertension accomplishes little if anything more than does the salt-poor diet ordinarily prescribed.

Goitre Prevention.

In an editorial on this subject in *Minnesota Medicine* for June, 1922, it is stated that in the early days iodine was undoubtedly well distributed throughout the earth.

Through the action of natural forces, the readily soluble sodium iodide, which is the salt of iodine commonly found, has been washed down into the sea, which now seems to be its chief source. Through action of air and spray from the sea, near-by vegetation contains iodine, and animal life near the seacoast obtains sufficient iodine for normal thyroid metabolism.

On the contrary, regions such as Switzerland, the Great Lakes basin and the Cascade Mountain region are practically devoid of iodine and are well known as goitre districts. The water of mountain districts is entirely lacking in iodine. It is interesting to note the great increase in the incidence of goitre in Vienna after the late Austrian Emperor Franz Joseph presented the city with a mountain water-supply. Seattle, Portland and Tacoma are said to have shown a similar increase as a result of receiving their water-supply from the Cascade Mountains.

Up to fifty years ago commercial table salt was procured from the ocean and contained iodine salts. Now, thorough refining processes have resulted in the elimination of the iodine from salt of sea origin. Salt from inland sources, such as the Great Salt Lake, contains no iodine. All these factors have resulted in eliminating iodine in large measure from human diet.

Animals and fish are subject to goitres as well as man—or shall we say woman. Land-locked salmon are known to develop goitres. Back in 1909, Marine and Lenhart prevented goitre in trout by the addition of iodine to the water in the ratio of one to a million parts.

The work of American investigators—Marine and his coworkers in particular—has called attention to the value of the addition of iodine to the diet, and they have proven the practical application of iodine administration for the prevention and cure of goitre by the addition of almost homeopathic doses.

In 1917 Marine and Kimball began extensive experiments on the schoolchildren of Akron, Ohio, and in brief the result of two and a half years' observation showed that only five goitres developed in some 2190 pupils who were given a grain of sodium iodide over a period of ten days twice a year, while 495 goitres developed in some 7320 cases who were not given the iodine. Observation showed, too, that this administration of iodine reduced roughly five times as many goitres as occurred in control cases not given iodine.

Klinger of Zurich reported a similar experience. The goitre incidence was reduced in 760 children from 90 per cent to 28 per cent in fifteen months by the administration of 10 to 15 mg. of iodine weekly. He also reported that thyroid enlargement in both the fetus and pregnant mother can be prevented by the administration of two grammes of sodium iodide during the first half of pregnancy.

We venture to predict that the time is close at hand when iodine will be given almost universally in this country, particularly in goitrous districts. Schoolchildren in the grammar-school grades need it most, for the adolescent goitre so common in young girls is most apt to occur from puberty on. It is a simple matter to give minute amounts of the sodium salt in sweet chocolate or wafers.

Perhaps the simplest method of iodine administration is the addition of minute quantities of sodium iodide (1 mg. to 15 grammes common salt), and without doubt a special brand of iodized table salt will be forthcoming on the market.

A note of warning should be sounded. Although no case of exophthalmic goitre developed in either Marine or Klinger's series, iodine is absolutely contraindicated in the exophthalmic variety of goitre. It is well established that care should be taken in the administration of iodine to adults with goitres that are suspected of being hyperactive. There is likely to be a rush for iodized salt or iodine in some form by individuals afflicted with goitre, and the profession will have to take care in advocating the use of iodine in the prevention of goitre to lay proper emphasis on its contraindication in cases of overactive goitres.

The Importance of Blood Chemistry to the Clinician.

In an editorial on this subject in the *Boston Medical and Surgical Journal* of June 1, 1922, it is stated that there are a certain number of tests which from both physiological investigation and clinical experience have been definitely shown to be of every-day value. Of these perhaps the most important and most generally used are the determination of the total non-protein nitrogen, or urea nitrogen, content of the blood and the determination of the sugar content. Mention should also be made of the gasometric method of determining hemoglobin, which may be used for the standardization of clinical hemoglobinometers.

Much has been written but little has been proved about the clinical significance of abnormal quantities of uric acid and creatinine in the blood. A very high value for uric acid with a normal value for the non-protein nitrogen is probably highly suggestive of gout. To what extent an increase in the uric acid or an increase in the creatinine content of the blood is of significance in the diagnosis and prognosis, respectively, of chronic nephritis remains to be determined.

The total fat and acetone bodies of the blood have been extensively studied, especially, of course, in diabetes, but other than in this disease these determinations are certainly not frequently required.

Of the inorganic ions, bicarbonate, chloride, phosphate, and calcium have received the most attention. Unfortunately the methods for the determination of calcium are too difficult to execute with accuracy to have been used very widely, though probably the determination of calcium will prove to be of diagnostic and prognostic value in some conditions, especially in tetany, rickets, and perhaps in certain cases with delayed coagulation time of the blood. Despite the many excellent, rapid and simple methods for the determination of chloride ion in the whole blood and plasma, and in spite of the large number of analyses that have been made, we are as yet wholly in the dark concerning the significance of the level of sodium chloride in the blood. We shall probably continue to labor in the dark until we have some understanding of the physiological and chemical systems of which sodium chloride is a part. Although recent work would seem to indicate that phosphate determination may be of value in the study of rickets, for the most part the situation with respect to the various forms of phosphorus in the blood is much as it is with respect to sodium chloride. Certainly, the phosphate level in the blood is not a simple linear function, as is perhaps uric acid in gout, of any particular underlying pathology. Until we know more about the relationship of the different phosphorus compounds to one another and to other substances in the blood we shall probably not make much headway.

Many attempts have been made to differentiate various types of disease by investigating the blood through physiochemical means. From a purely clinical point of view not much success has attended these investigations. But the field has only recently attracted very wide-spread attention, and there can be no question but that the application of physico-chemical methods to the study of the blood will yield important results, perhaps rather in the nature of

explanations of clinical phenomena than in the nature of tests which will be of diagnostic or prognostic value.

The clinical importance of blood chemistry is thus threefold. It gives to the physician new weapons for the investigation of disease in living patients. It affords a basis for the explanation of many signs and symptoms. It provides him with a few new signs, chemical tests, which may at times be of the greatest assistance in diagnosis, prognosis, or treatment.

Surgical and Genito-Urinary Therapeutics

A Roentgenologic Review of 750 Gastrointestinal Examinations.

DWYER *(Northwest Medicine,* Vol. XXI, No. 3, 1922) concedes a major part in diagnosis to the history of the case. He utters a word of caution against attributing to gastroptosis a multitude of evils, and quotes Canon to the effect that the chief reason for the diagnosis of ptosis is the lack of familiarity with the numerous pathologic lesions of the digestive tract or external to it, which give rise to gastric symptoms. Overenthusiastic use of the Roentgen ray in the search of gastrointestinal abnormalities is seldom unrewarded, and some degree of "gastroptosis" is the rule rather than the exception.

These patients cannot be cured by any method of gastric fixation, for we cannot as yet regard the stomach as simply an anatomic pouch because its functions are physiologic, and any surgical attempt to improve the impairment of the motor function at the expense of the natural movability of the organ is working contrary to nature.

To tell an already neurotic patient that she has "a fallen stomach" is to immediately convert her into a confirmed neurasthenic, which will require the untiring efforts of several physicians before such an idea can be eradicated, if she has not by that time resorted to Christian science.

He summarizes his article as follows:

To find organic gastric pathology in those patients complaining of general stomach symptoms is an exception rather than a rule. Eighty-five to 90 per cent have no organic basis in their stomachs to account for their symptoms. The large majority fall under the head of extra-gastric and functional.

When a reflex stomach may account for the Roentgen findings, all such patients should be reëxamined after having been properly instructed to take an antispasmodic which will occasionally prevent a needless gastric operation.

The earlier employment of the Roentgen ray is urged as a means of diagnosing early carcinoma, whereby the percentage of inoperable carcinomas of the stomach may be lessened at the time the diagnosis is made.

Syphilis of the stomach should be differentiated from carcinoma before operation, or at least this condition should be strongly suspected and the patient placed under careful clinical observation before operation is advised.

If we must consider gastroptosis as a clinical entity, let us impart our findings to the physician, but abstain from describing such a condition to the patient.

The Roentgen examination of organic conditions of the gastrointestinal tract, if properly employed, is the most potent single method of diagnosis. Its negative examinations are a great aid in arriving at an ultimate clinical diagnosis.

A roentgenologist should never report that which he does not see. He should never force his *x*-ray findings to conform with the clinical findings, even though such findings appear specific. He should hold himself open to just criticisms from the internist and surgeon, remembering that

either side is capable of error. What an internist or surgeon wants in an *x*-ray report is brevity. A radiologist should make a positive or negative diagnosis, or if in doubt call it indeterminate, and not go into an exhaustive treatise of all the Roentgen signs, which as a rule only serve to confuse the physician who referred the case.

Roentgenology is not a mysterious science, whereby the examiner can always find pathology if it exists. The operating room illuminates many mistaken diagnoses of roentgenologists as well as clinicians, and a man who does not make occasional mistakes in diagnosis has had few patients to examine.

Whenever possible, one should follow his patients to the operating room, where he will learn almost as much roentgenology as examining them behind the screen.

Ligation of the Innominate Artery.

BALLANCE *(British Journal of Surgery,* January, 1922) reports a case completely cured by proximal ligation. Dilatation occurred at the bifurcation of this vessel. He quotes Thomson, who in 1915 had collected 52 cases of ligation of this vessel for subclavian aneurism. There were 16 recoveries. He lays stress on the following points:

That cases about to be submitted to operation should not be previously treated by the method of Valsalva.

That there is a group of cases of aneurism of the innominate artery (aneurism of the bifurcation) which are suitable for proximal ligature. Distal ligature causes the aneurism to become a diverticulum of the aorta, and so increase the pressure within it, and should not be done when proximal ligature is possible.

That the presence of aneurism necessitates removal of a part of the sternum in order to gain a free and clear exposure of the vessel below the aneurism.

That the ligation of the innominate may be safely and surely accomplished if the ligatures are tied in a stay-knot without rupturing the coats.

The Possibilities of Pneumoperitoneum in Gastrointestinal Diagnosis.

SANTE *(Journal of Radiology,* Vol. III, No. 2) states that by means of gaseous inflation tumors of the posterior wall of the stomach may be demonstrated. Adhesions of the small intestines to the surrounding organs and the abdominal wall constitute the most important lesions of the intestine that can be thus shown. Inflammatory lesions the result of subacute peritonitis are readily recognized since the intestines are not displaced with the change of posture on the part of the patient. The method establishes as a rule without difficulty the contents of hernias, pneumoperitoneum disclosing either the gas-filled hollow viscus or the dense omental tissue. When the operative findings are not known and there is a suspicion of malignancy of a stomach involved in a postoperative scar or hernia, this method gives excellent information.

The author states that at the present state of development of technique the pneumoperitoneum cannot be used as a substitute for barium meal examination, and calls attention to the fact that it is especially applicable to certain lesions of the stomach most difficult to detect by the barium meal, notably lesions of the anterior and posterior stomach wall.

Suprapubic Versus Perineal Prostatectomy.

HINMAN *(California State Journal of Medicine,* April, 1922), reporting on 134 cases, thus summarizes his conclusions:

"This analysis clearly demonstrates that in our hands Young's perineal prostatectomy excels the suprapubic operation in every respect. It has given a lower mortality, 2.2 per cent, as against 15 per cent; and a higher percentage of cures, 83 per cent as against 38 per cent, even in spite of the handicap of less promising material. We now have eighty-one consecutive unselected cases successfully operated by way of the perineum without death. Recto-urethral fistulæ, persistent perineal fistulæ and incon-

tinence have been absent in all our later cases and at no time troublesome, and though five years is the longest time since operation, we have yet to have one case return with a recurrence of prostatism.

"The generally poor results that have been reported for Young's perineal prostatectomy are, in our opinion, directly blamable to the inexperience of the operator rather than the fault of the operation. With other types of perineal operations we have had no experience. Properly performed, Young's is an ideal surgical procedure, but presents two types of technical difficulty —the anatomical approach and the actual glandular enucleation. Errors in the first lead to injuries of the rectum or external sphincter; in the second, to structural defects, with either persistence of prostatism or its recurrence.

"Prevention of surgical errors in the anatomical approach comes by experience and a knowledge of the anatomy of the perineum; prevention of the structural defect is best secured by a complete, clean removal of the hyperplasia. This is simpler and more certain by the modified method of enucleation, whereby the hyperplastic mass can be accurately dissected out intact under direct control of the eye. In the twenty-five cases in which this perineal en masse enucleation has been used, the immediate and later results have been most gratifying, 100 per cent functional cures."

The Diagnosis of Latent Neurosyphilis.

GRAY *(American Journal of the Medical Sciences,* March, 1922) calls attention to the need of lumbar puncture in the diagnosis of syphilis. Based on a somewhat limited experience, he states that out of 20 punctures only one of his patients made a fuss at the idea of the preliminary harnessing with a Sam Browne belt with sling removed, which was used instead of the knotted sheet placed by some around the neck to hold the chin against the knees, to keep the lumbar spine well arched and immobile, and to afford the patient something firm to strain against. As a further refinement the author placed a plank under the mattress along the edge of the bed to prevent sagging. The patient lay on his left side. Morphine was also administered to many of his patients. He summarizes his article as follows:

In 62 medical cases, all supposedly nonvenereal, were found 8 syphilitics, only 2 of whom knew of their disease.

In these 8 syphilitics were 5 with C. N. S. involvement, hitherto unrecognized in all.

The army principle of relying on the physical examination and neglecting the history leads to the overlooking of syphilis in the army.

Since neurosyphilis is so important it should be more generally suspected in an internal medical clinic.

Lumbar puncture should be done (preferably after preliminary fundus examination) on every syphilitic. Watchful waiting in syphilis does far more harm than occasional accidents incident to puncture.

A Review of 100 Cases of Pyelonephritis.

FOOTE *(California State Journal of Medicine,* April, 1922) critically reviews 100 cases. He has excluded the infection as it occurs in children and that secondary to obstruction of the urinary tract, or that which is found as a complication of cerebrospinal syphilis. He concludes his study as follows:

Pyelonephritis occurs more frequently in females than in males, due to pregnancy and gynecological procedures. The latter should be preceded by the administration of urinary antiseptics, and these should be continued during convalescence.

Pyelonephritis is extremely common in childhood, is less frequent during youth, and again appears throughout life. From this it is concluded that the large majority of cases occurring in children spontaneously recover. There are occasional cases in which this does not occur; their resistance is so lowered as to render them susceptible

to other infections, proving fatal. Children in whom pyelonephrosis exists for a long period of time should be given the benefit of pelvic lavage. There is practically no difference between the right kidney and left kidney in incidence of infection.

Clinical observations of marked bladder disturbances and of infection of the urine, subsequently followed by pain in the renal regions and fever, have led to the conclusion that ascending infection may occur and probably often accounts for the bilateral nature of the disease.

Pyelonephritis is most often emphasized by bladder disturbances alone, but it may be associated with pain abdominal in type, and when associated with acute infection may be extremely difficult to differentiate from urinary infection associated with appendicitis. Not all cases of pyelonephritis show pus in the urine. Direct slide smears are of more value than cultures. There are infections of the urinary tract other than tuberculosis which, in the absence of urinary antiseptics, will not grow on ordinary media. It is not one of the functions of the kidney to excrete bacteria, and the finding of bacteria in kidney urine is evidence of a pathological process in that kidney. Chronic nephritis associated with infection of the kidney is not uncommon. The presence of large amounts of albumen in these cases has in some instances led to exhaustive studies with total neglect of the kidney itself as a focus of infection.

Persistent cases of pyelonephritis in which no stasis is present may have as their cause gastrointestinal stasis. Pyelograms should be made in cases of persistent pyelonephritis to demonstrate the absence or presence of ureteral stricture.

Diagnosis of Tumors of the Cauda Equina.

PARKER *(American Journal of the Medical Sciences,* March, 1922) concludes an interesting illustrated clinical study of this subject as follows:

Tumors of the cauda equina, conus and epiconus are not rare. Of thirty-three patients with tumors of the spinal cord operated on since 1916, eight had tumors in one of these areas.

The course of the disease to the time of operation was relatively long, the longest being eight years and the shortest five months.

The signs and symptoms are characterized, on the whole, by pain and weakness of the lower extremities and perianal or saddle anesthesia, with loss of control of the bladder and rectum.

The pain may precede the other signs for many months; intermittent at first, it is constant toward the end. Movement usually relieves it, and a sitting position is felt by the patient to be the most comfortable.

Sphincteric disturbance may be absent, although other signs are well marked.

Spinal puncture is a valuable aid, primarily to exclude other diseases; it may also give a hint of the condition of the dural canal.

While diagnosis of tumor somewhere in the lowest segments of the cord is comparatively simple, its exact localization is often impossible or extremely difficult, and a surprising degree of involvement of structures is often present with few signs and symptoms to correspond.

Treatment of Cardiospasm.

MUTCH *(The Practitioner,* cvii, No. 5) lucidly describes this condition as "the failure of the lower end of the esophagus to consummate the act of deglutition." He alludes to the futility of medical treatment, and states that relief may be obtained only by dilatation of the cardiac sphincter to a paralyzant degree. He calls attention to the now accepted method of passing a rubber bag, placing it within the grip of the sphincter and blowing it up, the amount of pressure applied being measured by a manometer. Where the esophagus is much dilated the end of a long silk thread should be swallowed the night before, to act as a guide for the dilating instrument. He keeps his patient in front of the *x*-ray screening

stand and observes the proper place radioscopically that dilatation is begun. Water is used and a pressure from 600 to 650 mm. is employed. He quotes Plummer to the effect that 81 per cent are cured by this means.

Some Points in the Surgery of the Right Iliac Fossa.

ADAMS *(The Practitioner,* cvii, No. 5) after a discussion of appendicitis, with leaning toward conservative treatment when the diagnosis is not absolutely sure, considers the subject of ileocecal tuberculosis, which he regards as a secondary manifestation of the disease and occurring most commonly between the twentieth and fortieth year. The symptoms are indefinite, and the treatment is by resection of the lower end of the ileum, together with part of the ascending colon.

As to cecoptosis and visceroptosis, the author favors treating these by the use of an abdominal belt and the operation of colopexy. The indigestion incident to visceroptosis and abnormal mobility of the cecum he believes can be cured by proper abdominal support, and quotes a case to prove it.

There is at the present time a reaction against operation for visceral displacements due to lax abdominal walls, and a large clinical evidence to prove that a properly applied abdominal support will give a measure of relief so great that many of these patients are restored to complete health.

Resection of Bartholin's Glands.

BARRINGER, WILLIAMS and WILSON *(New York State Journal of Medicine,* April, 1922) recommended the routine removal of diseased Bartholin's glands from the patients admitted to the gonorrheal wards in the Kingston Avenue Hospital. Their experience has been that many acute infections of Bartholin's glands resolve entirely under expectant treatment. Those in which the enlargement persists are best treated by operation. This because these glands may be regarded as foci of continued local and general infection. Their approach is through the vaginal wall.

"By approaching the gland from the vaginal route, the gland is dissected out from under these structures, without cutting through them, as a rule. In our series we have approached all the glands by the vaginal route, including the larger cysts and abscesses.

"The method has been to retract the labia minora on the affected side, thereby opening the vaginal orifice as widely as possible; then with the thumb and index finger the infected gland is grasped and pulled as far as possible out into the vaginal orifice. Still holding the gland firmly, the incision, about 2 cm. in length, is made over the height of the tumor, and parallel with the edge of the vaginal orifice.

"If the gland is of the enlarged fibrous type, it is quite simple to cut down through this original incision, until the gland presents self; then the gland can be firmly grasped with a tenaculum forceps, and the further dissection around the gland completed with blunt scissors dissection.

"If there is either a cyst or abscess of the gland, it calls for much more careful dissecting, as it is most desirable not to rupture the sac."

Among these patients complement fixation studies were made, as were culture studies of the glands removed. The conclusions are as follows:

"With three out of twenty chronic cases showing positive smears and cultures for gonococcus, we feel that this operation is justifiable.

"We feel that it should be recommended as a matter of routine on a venereal service where there is opportunity to do it under proper surgical conditions.

"The chief danger is hemorrhage, which should be carefully controlled at the time of operation.

"We have found no contraindication for the vaginal route, but on the contrary consider it superior to the external one, for the following reasons:

"There is probably less hemorrhage, as

the bulbus vestibuli is less likely to be injured. There is less dissection, as the vagina is the only structure to sever before reaching the gland. The healing process is as rapid, and we believe superior to the external route. There is no external scar or depression of tissue. In the majority of cases the vaginal wound is scarcely discernible.

"We believe that this series has brought out the possible value of a persistent positive complement fixation reaction, as indicating that there is still an active focus of gonococci, even if smears and cultures of the discharges are negative. All three of our positive cases had given positive complement fixation reactions.

"The remaining thirteen cases with positive complement fixations had had, during their stay in the hospital, involvement of either Skene's glands, urethra, cervix, or tubes, any one of which might still be an active focus in a given case.

"Further study of groups of cases with special reference to these undetected foci may establish the fact that the complement fixation test is the surest means of estimating when a cure has been effected, and that we are justified in keeping a patient under treatment as long as the test remains positive."

Pseudo-coxalgia.

An excellent study of this subject is presented by PLATT *(British Journal of Surgery,* Vol. IX, No. 35, 1922), well illustrated by both radiograms and brief clinical histories.

He asserts that "pseudo-coxalgia," or osteochondritis deformans juvenilis coxæ, is an inflammatory lesion of the upper end of the femur, the changes being subchondral in location.

The condition is most probably due to a definite infection of low-grade virulence. It is impossible to postulate the exact site of the primary implantation of the infection, which reaches the femur by the bloodstream; in the well-marked active phase all the joint elements participate in the cycle of osseous changes.

The disease is to be regarded as a definite pathological entity amongst the hip-joint affections of childhood.

Pseudo-coxalgia shows a definite predilection for the second half of the first decade of life.

In the period of adolescence, the reaction of the hip-joint to the type and grade of infection which produces pseudo-coxalgia at an earlier age is manifested by the production of an arthritis deformans. Arthritis deformans juvenilis is never seen during the age period appropriate to pseudo-coxalgia.

The tendency toward the occurrence of spontaneous recovery in pseudo-coxalgia is common knowledge. We have seen how the duration of those subjective signs which indicate the existence of joint irritability may vary considerably, how the ultimate shape of the femoral head may occasionally be little changed from the normal or may be conspicously deformed, and how the resulting abnormal hip-joint may in adult life, in response to the incidence of strain or infection, become a source of disability to its possessor. It is thus pertinent to consider the possibility of so influencing the conditions of the hip-joint as to produce an arrest of the steady march of the bony change in order to insure as full restoration of the femoral head as may be possible.

This problem resolves itself into a consideration of the effects of the conservative maneuvers of immobilization and protection of the hip-joint, and, at the other extreme, the applicability of operative treatment directed toward the eradication of localizable inflammatory foci in the epiphysis or diaphysis.

Pseudo-coxalgia, or osteochondritis deformans juvenilis coxæ, is a definite entity representing the reaction of the metaphysical region of the upper end of the femur to the stimulus of an infective agent of attenuated virulence.

The condition is comparable with the arthritis deformans juvenilis coxæ which is seen solely in adolescents, and which represents at this age period the reaction of the hip-joint to an infective agent of a similar type.

The whole cycle of radiographic changes is peculiar to pseudo-coxalgia alone. They precede and outlast the clinical phenomena. The final picture is dominated by the deformation of the head of the femur, which is enlarged and flattened. The acetabulum in its final form can no longer contain the whole of the expanded head.

Deformation of the head of the femur with flattening and expansion is seen also in conditions distinct from pseudo-coxalgia during childhood. There is no evidence to show that in these conditions the typical structural osseous changes of pseudo-coxalgia have preceded the stage of flattening. At certain stages the clinical and radiographic pictures of the two groups of affections may show considerable resemblance. This applies particularly to cases of primary tuberculous osteomyelitis of the femoral neck.

In the conditions known as tarsal scaphoiditis (Köhler's disease) and apophysitis of the tibial tubercle (Osgood-Schlatter disease), bony changes parallel to those in pseudo-coxalgia are found.

Conservative treatment directed toward the elimination of weight-bearing has no proved influence on the train of morbid changes, but its application is indicated during the stage of prominent symptoms. Operative treatment directed toward the removal of the dominant lesion has no present place in the therapeutics of this disease.

Salvarsan Jaundice.

CHAMBERLAIN *(Lancet,* April 15, 1922) uses the word salvarsan as a generic term covering the arsenobenzene compounds of approximately the 606 or 914 formulas commonly used in intravenous medication. Of 1200 syphilitic cases treated at the Lock Hospital in the last three years, he has observed 64 cases of jaundice; 54 of these occurred some time after the course of salvarsan. Four immediately after injection were accompanied by a recurrence. There were two cases in which no salvarsan had been used, and four cases of what he calls "fortuitous jaundice." The majority of cases occurred between the ninth day and thirteenth week following a course.

He believes that the danger of jaundice may be lessened by giving the arsenic at regular intervals. Chamberlain warns against the use of cracked ampoules, speaks of sensitization of a certain individual, and advises that the patient lead a hygienic life during the course of treatment.

The Diagnosis and Treatment of Tuberculous Empyema.

HEDBLOM *(Surgery, Gynecology and Obstetrics,* April, 1922) observes that from a pathological point of view, tuberculous pleurisy may be subdivided into primary and secondary forms. To the first belong the cases of initial involvement of the pleura; to the second, cases following lesions of the lungs, chest wall, or glands. Some writers consider all cases of tuberculous pleurisy secondary to pulmonary involvement. Cases occur, however, in which there is no demonstrable focus in the lung. In such instances the lung tissue possibly furnishes only the avenue of infection.

Primary tuberculous pleurisy with or without effusion, which has its analogue in primary tuberculous peritonitis, probably occurs more frequently than is generally recognized. Hodenpyl found nodules and patches on the visceral pleura in 44 of 91 cases in which the lungs were free from tuberculosis.

The question of the etiology of primary or idiopathic pleurisy with effusion is of especial importance in the consideration of tuberculous empyema. Although Cabot, Rist, and Webb expressed doubt with regard to the tuberculous nature of the primary serous effusions observed in the American Expeditionary Forces, there is much evidence to substantiate the view commonly accepted that save for an occasional instance of effusion complicating unrecognized pneumonia, these are tuberculous in nature. This evidence is furnished by the investigation of the further history of cases of pleurisy with effusion, and by a study of

the fluid. Series of patients whose course is followed for from five to twenty years show that from 35 to 55 per cent eventually die of tuberculosis. Insurance companies find that deaths from tuberculosis among persons having had pleurisy with effusion is three times the average. Of special interest is a series of Koester, who found that of 514 patients 245 became tuberculous. About 50 per cent of the patients had active lesions before the end of five years, but a latent period of ten years or more was noted in about 7 per cent of 164 cases.

The demonstration of tuberculosis bacilli in the serous exudate constitutes the most convincing evidence of its tuberculous nature. Direct examination of the sediment obtained by centrifugalizing the digested clot, the so-called inoscopy of Jousset, and animal inoculation, have yielded positive results in from 20 to 85 per cent of the cases.

Tuberculous infection of the pleura is a common concomitant of pulmonary tuberculosis. Osler writes that the visceral pleura is always involved. The frequent resultant partial obliteration of the pleural cavity may account for the fact that a relatively large proportion of cases do not develop late effusion.

Positive proof of the tuberculous nature of a purulent exudate is afforded by finding the bacilli in the exudate by direct examination, by animal inoculation, or by a demonstration of the characteristic microscopic picture in the excised pleura. Unfortunately the demonstration of the bacilli in the exudate is usually difficult, and the animal inoculation test results in many failures and requires at best six weeks of time. The examination of pleural tissue is a postoperative procedure. In the ordinary case, therefore, a presumptive diagnosis must be made on the clinical history of the case, the character of the exudate, and the recognition of a tuberculous process in some other organ.

Cabot showed that in a series at the Massachusetts General Hospital of 300 patients with pleurisy, 67 per cent who later developed tuberculosis had a positive family history, while only 25 per cent of those who remained well had such a history. An insidious onset without preceding infectious disease, especially if accompanied with fever, night sweats, loss of weight and strength, loss of appetite, and progressively increasing nervousness, is always suggestive of tuberculous infection. The cases with insidious onset in apparently healthy, robust persons are among the most difficult to recognize.

In cases without drainage, sterile, purulent fluid, especially in the presence of fever and with a low leucocyte count, is almost certain to be tuberculous.

A sterile effusion in a closed cavity may be serous, hemorrhagic, or purulent. The presence of enough exudate to be clearly recognized clinically is usually considered as an indication for aspirating as much of the fluid as can be obtained. Certainly enough fluid to produce symptoms of mechanical embarrassment to respiration and circulation is generally considered a clear indication for the aspiration of large amounts of fluid. Evidence has been brought forward, however, to show that a sterile exudate exerts a healing effect in a tuberculous process in the lung. Koeniger reports 78 cases in which marked improvement occurred in all but 3 per cent, and the improvement seemed lasting in more than half.

It appears very doubtful if it is ever advisable to remove large amounts of fluid at one time. Aside from a possible biological influence exerted by the fluid, its aspiration may exert an unfavorable influence on a coexisting incipient or active pulmonary lesion.

Clinical experience has also shown that, whereas aspirating a large amount of fluid seems to stimulate further exudation, the aspiration of a relatively small amount results in an augmented rate of spontaneous absorption.

In order to prevent reëxpansion of a tuberculous lung, whether by aspiration or rapid spontaneous absorption of the fluid,

nitrogen or filtered air may be injected to replace all or a part of the volume of the fluid removed. Such treatment is especially indicated in case effusion follows artificial pneumothorax therapy.

Patients with sterile purulent exudate are of the type most liable to become the victims of injudicious surgery. This condition represents an exception to the rule *ubi pus ibi evacua* for the simple reason that there is no pus in the sense of the word used in this hackneyed phrase. A sterile, purulent exudate presents essentially the same condition as a serous exudate, and should be treated on the same principles.

A mixed tuberculous and pyogenic infection in a closed cavity, especially with marked sepsis, requires prompt drainage, either by the open or by the closed method, with antiseptic solution cleaning. Sterilization by the antiseptic irrigation of the closed cavity has the distinct advantage that the cavity may be considerably reduced in size, and a later extrapleural plastic operation may be performed if a cavity persists. The use of an irritating, and especially of a corroding, fluid, such as Dakin's solution, is, however, contraindicated in any case of well-marked pulmonary lesion, because of the tendency to bronchial fistula and hemorrhage from the action of the fluid on the exposed diseased area of the parenchyma of the lung.

Cavities following drainage operations vary from those in which there is only a residual tubular or sinus tract to those in which the entire pleural cavity is involved. With cavities of long duration the pleura is usually thickened. Antiseptic solution irrigation in such cases is not only safe, but usually is followed by marked improvement in the patient's general condition. There may be very little thickening of the pleura, however, as in several cases in this series. In one of these symptoms developed suggesting small bronchial fistulæ and a lighting up of a tuberculous lesion.

The hypochlorite solution seems to have little or no influence on the tuberculosis bacillus in these cases. Scholl observed a case at the Rockefeller War Demonstration Hospital in 1917 in which an empyema cavity of about 500 cubic centimeters capacity was treated with 100 cubic centimeters Dakin's solution every two hours for ten days. Cultures for tuberculosis at the end of that time were positive, showing that the solution did not kill the bacilli.

Small cavities and sinuses seem to constitute favorable cases for the use of bismuth paste. Beck reports a cure in about 80 per cent of 150 cases of chronic empyema, but he does not state what proportion of these cases was tuberculous.

Tuberculous empyema with large bronchial fistula due to rupture of a cavitation into the pleura may result in a virulent secondary infection and require prompt drainage, usually by wide incision, as irrigation with antiseptics is impossible. The immediate mortality in these cases is high.

Primary or idiopathic pleurisy with effusion, in a large proportion of cases, is probably tuberculous in nature.

A past history of pleurisy with effusion is common in cases of tuberculous empyema. In many cases the effusion is serous at the onset.

Tuberculous pleurisy may be primary, or it may be secondary to a pulmonary, peritoneal, or other tuberculous lesion.

The onset of a tuberculous effusion may be insidious or it may be sudden and associated with an acute and severe constitutional reaction. A mixed pleural infection due to the perforation of a tuberculous cavitation often runs an acute and rapidly fatal course.

Diagnosis of tuberculous empyema is made by demonstration of the bacilli in the exudate, by animal inoculation, or by examination of the sectioned pleura.

A sterile effusion is probably tuberculous. An infected effusion may be tuberculous.

Empyema following primary idiopathic pleurisy with effusion, or empyema of insidious onset, especially in the presence of a pulmonary or other tuberculous condition, is probably tuberculous.

Empyema may be tuberculous in spite of

persistent negative findings over a long period of time.

In a closed pleural cavity a sterile effusion, whether serous or purulent, should not be treated by open drainage, except in the presence of an impending perforation of the chest wall.

Repeated aspiration of only part of the fluid present is indicated in cases of serous effusion producing definite dyspnea on exertion or symptoms of circulatory embarrassment.

The replacing of aspirated fluid by nitrogen or filtered air may be indicated in cases in which there are symptoms of active phthisis referable to the same side as the effusion.

A sterile purulent effusion should be treated as though it were serous if the lung expands when fluid is withdrawn. If the lung is fixed in a collapsed condition or if the effusion persistently recurs, an extrapleural plastic operation is indicated.

Effusion in a closed cavity showing a mixed infection should be treated by the closed method with antiseptic solution irrigation, or by open drainage; the open drainage is indicated especially in cases of severe infection associated with extensive pulmonary tuberculosis, making irrigation hazardous.

Tuberculous empyema with a large bronchial fistula should be drained by the open method.

A large tuberculous empyema with mixed infection from a previous drainage operation or from spontaneous perforation of the chest wall requires a plastic operation; preferably after treatment with Dakin's solution.

A plastic operation involving closure of a bronchus offers the only prospect of cure in case of an associated large bronchial fistula.

Dakin's solution irrigation may be contraindicated in the presence of an extensively diseased lung, owing to its corroding action on any superficial lesion, possibly resulting in hemorrhage or the formation of a bronchial fistula.

A plastic operation is usually eventually required in the case of closed cavities when the empyma is of long standing, and of all large, open, secondarily infected cavities.

An extrapleural rib resection is indicated for the collapse of closed sterile cavities. The Boiffin-Wilms operation is especially suitable for the collapse of large cavities without excessive thickening of the parietal pleura or rib deformity.

A skin or skin-muscle plastic is indicated for the obliteration of relatively small cavities. Cases of long standing associated with greatly thickened pleura require an extensive resection of the entire chest wall after the method of Schede.

Operation in several stages is especially indicated in the treatment of tuberculous empyema, and, if practicable, it should be preceded by antiseptic solution irrigation. Such treatment should extend the indications for operation and should lower the postoperative mortality.

Cranial Injuries Treated by Prompt Lumbar Puncture.

JACKSON *(Surgery, Gynecology and Obstetrics,* April, 1922) notes, after calling attention to the fact that our present classification of brain injuries, in view of which the symptoms are explained on the basis of concussion or compression, is illogical, suggests that we should employ the term concussion alone. He considers the only symptom of value the detection of tension by means of the spinal needle and manometer. He observes that middle meningeal hemorrhage is shown in 20 per cent of the cases of head injury that come to autopsy. He regards the manometer as the best means of giving an accurate prognosis and thus summarizes treatment:

"An examination of the head to determine site of injury and to rule out depressed fracture—first by inspection and direct palpation, and later by *x*-ray.

"Routine lumbar puncture. Take pulse and blood-pressure before and after puncture. If blood is present in fluid and the pressure is high withdraw 10 to 20 cubic

centimeters cerebrospinal fluid, determining the fall in pressure by special stop-cock arrangement of needle attached to mercury manometer, and stop withdrawing fluid when pressure has been reduced one-half or to normal. If pressure reading is high and no blood is present in fluid, suspect middle meningeal hemorrhage without rupture of dura.

"As to technique, have the patient on right or left side in horizontal plane and on an unyielding surface, with spine flexed—if necessary in a restless patient give a preliminary hypodermic of morphine, or gas anesthesia. Surgically cleanse area of fourth lumbar interspace and insert needle in midline. Withdraw stilet, and as soon as cerebrospinal fluid appears, connect needle with mercury manometer held by assistant at level of spine and take reading. Then open side arm and collect cerebrospinal fluid in graduated sterile test-tube. Shut off fluid when 10 or 20 cubic centimeters is collected or when pressure reaches normal, withdraw spinal needle and seal with collodion.

"The instrument is a simple U tube with side arm, made for the writer by Mueller & Co. Attached to the side arm is a rubber tube which connects readily with the lumen of the needle by a metal sleeve. The needle is one millimeter bore and has a horizontal stop-cock which allows withdrawal of cerebrospinal fluid without disconnecting the manometer, so that one can see the fall in mercury column while withdrawing fluid.

"Treat shock by usual methods.

"Repeat lumbar puncture at intervals of six to twenty-four hours or longer, depending on height of pressure and rapidity with which pressure rises after withdrawal of fluid.

"Other routine examination of the eye-grounds, reflexes, pulse, temperature, respiration, etc., are needful to complete the physical examination.

"Keep patient in bed for four weeks in severe cases, and take pressure reading before patient leaves the hospital to rule out any tendency to chronic hypertension."

Jackson thus ends his paper:

"The following conclusions may reasonably be deduced from observation of the clinical cases and from the experimental work on dogs.

"In most acute injuries of the brain the cerebrospinal fluid pressure is a fair index as to the severity of the lesion. Dependable prognosis can be made by any increase or decrease of this pressure. A new clinical classification of injuries of the brain based upon cerebrospinal fluid pressure alone, as shown by the mercury manometer, is superior to the accepted classification of concussion, contusion, and compression.

"The pathogenesis of acute injuries of the brain demonstrates that the principal effect of the edema of the brain and hemorrhage is to interfere with the absorption of cerebrospinal fluid by the usual paths; this sets up a vicious circle causing further pressure on the brain by the accumulating fluid in the basal cisterns below the tentorium cerebelli, and in the lateral ventricles which presses the brain upward against the dura and produces cortical anemia. The cortical anemia, if unrelieved, quickly leads to gliosis, causing lasting changes in the character, disposition, and mentality of the patient, if he recovers from the brain injury.

"The relief of the increased pressure on the brain and the reëstablishment of the normal path of absorption of the cerebrospinal fluid can be obtained by repeated lumbar drainage, which in acute injury cases is absolutely without danger. Lumbar drainage is superior to subtemporal decompression in relieving pressure below the tentorium cerebelli, and has the further advantage that it leaves no mutilating skull defect. The use of concentrated salt solutions intravenously lowers cerebrospinal tension but does not remove blood.

"Experiments upon dogs, producing pressure on the cerebrum and on the medulla, show that the pulse, respiration, and blood-pressure are affected only when the medulla is compressed. Therefore to wait for these changes as an indication for operation on the cerebrum in acute cranial injury is to court disaster."

End-results in Two Hundred and Thirty-two Hysteromyomectomies.

CLARK and NORRIS *(Surgery, Gynecology and Obstetrics,* April, 1922) thus conclude a brief but able paper:

Hysteromyomectomy is productive of excellent end-results whether or not ovarian conservation is practiced. Of all patients in the writers' service, over 99.5 per cent were cured or improved, and over 83 per cent declared that their general health was good or improved one year or more after operation.

Better end-results and greater comfort to the patient can be secured as the result of ovarian conservation.

Everything being equal, better end-results follow the conservation of both ovaries than the retention of one, but one ovary is far better than none.

Conserved ovaries seldom give subsequent trouble. Among 171 cases in which ovarian conservation was practiced, 261 ovaries were conserved, and in none of these patients was a second operation for the removal of the ovary necessary. This is a strong argument in favor of ovarian conservation in this class of cases, for if the conserved ovary does not give trouble, there can be no excuse for its removal.

That conserved ovaries may give subsequent trouble is conceded, as is also the fact that the series of cases quoted may have been unusually fortunate in this respect. Successful ovarian conservation depends upon the condition of the ovary at the time of operation, the maintenance of an adequate blood supply, and the retention of the ovary in its normal position.

The authors believe that undue emphasis has been placed upon the frequency of cystic and other forms of degeneration in conserved ovaries, and that attention to the points just mentioned will largely abrogate such disturbances.

Bearing in mind the fact that good results can be secured by performing bilateral oöphorectomy, it is often better to sacrifice a doubtful ovary than to spare it. This is a point, however, on which each case must be judged individually.

When both ovaries are removed, the surgical menopause is by no means severe in all cases, those patients who suffer unduly being in the minority.

The age of the patient is not an unfailing criterion as to the severity of the surgical menopause in any given case. Young women will sometimes bear the loss of both ovaries well, whereas some of the most severe phenomena of the surgical menopause encountered in this series have occurred in patients past forty years of age. This does not imply that the age is an unimportant factor in considering the question of ovarian conservation. Other things being equal, there is no doubt but that younger women suffer more severely as a result of bilateral oöphorectomy than do those who are older.

A more important guide than the age, however, is the temperament of the individual patient. The highly strung, neurotic woman is likely to suffer more severely than her more phlegmatic, asexual sister.

Each case should be individualized. The temperament of the patient should be studied, and a correlation of this with history and the pathological process found at operation should determine the type of operation to be performed.

Conserved ovaries functionate.

Even in those patients in whom the ovary does not functionate permanently, the occurrence of the surgical menopause is less abrupt and severe than in those women upon whom a bilateral oöphorectomy has been performed. Among the former class of cases the artificial menopause generally resembles the normal menopause more closely than does that following the removal of both ovaries.

Plastic Operations.

ELOESSER *(Surgery, Gynecology and Obstetrics,* April, 1922) notes that a graft of the whole thickness of skin, whether done at one sitting as a Wolfe-Krause graft, or at several, as an Italian plastic, always remains an island surrounded by scar.

It turns blue on exposure to cold and is little resistant to infection or trauma.

A pedicled flap which retains the normal vascular connection does not have these disadvantages.

A procedure is described for making a semidetached flap, severing the skin of the pedicle but retaining its vessels. Such a flap has much of the freedom of a free graft but does not have its disadvantages.

More blood runs through the pedicle of an Italian plastic flap than through the line of union with its new bed, no matter how narrow the pedicle, or how long the line of union.

The vascularity of the pedicle should not be damaged by mattress or tension sutures.

Infection should be limited by covering the defect left by an Italian flap with an immediate Thiersch graft.

The viability of the flap is determined by temporarily occluding the pedicle with a rubber band before finally severing it.

The defect, after excision of a flexion contracture of a finger, may be covered by a flap from a neighboring finger.

Drooling may be relieved by transplanting Stenson's duct backward.

Extra-genital Chancre in an Unusual Position.

FRASER *(British Journal of Dermatology and Syphilis,* No. 398, vol. xxxiii, No. 12) observes that the natives of South Africa rarely exhibit the lesions of primary syphilis, excepting where they are employed in the industrial region. One reason for this is that the native pays little attention to any sore which does not cause him pain and which does not rapidly spread. It is noted that in certain parts of Southeastern Europe the ratio between extra-genital and genital chancres may be as 20 to 1. A native is described as, generally speaking, an exceedingly moral being. The author states that it is not looked at askance if the adult uses a native child for the gratification of his sexual desires, not, however, making vaginal penetration. He reports two cases of children exhibiting sores on the inner surface of their arms near the axillæ, each probably incident to the practice alluded to above.

The Non-operative Treatment of Ureteral Calculus.

BUERGER *(Medical Record,* April 1, 1922), after noting that the attention of the urologists has in recent times been centered upon the non-operative delivery of stones impacted in the lower part of the pelvic ureter, observes that it is of vital importance that stones placed elsewhere in this channel should be so dealt with that the kidney does not sustain irreparable damage. Renal colic is due not to mechanical irritation of the stone, but to distention of the renal pelvis and the ureter. It, together with lesions which inevitably follow long retention, may be avoided by passing a catheter beyond the calculus and draining the urine. Stones of more than quarter of an inch in diameter are usually arrested. Even smaller ones may be caught. The case is reported of a man who, after a second attack of renal colic and the passage of blood, was cystoscoped. The obstruction was found two centimeters above the bladder in the left ureter. A ureter catheter was finally introduced past it and the renal pelvis was drained. A pyelograph showed a typical hydronephrosis. A month later a second examination showed retained urine in the renal pelvis. It was drained by a catheter, a second instrument being passed beside the first. This caused considerable dilatation of the ureter and permitted the stone to descend. The author states that this case, as well as other similar ones, justifies him in drawing the following conclusions:

Chronic states of hydronephrosis may result from leaving the expulsion of the stone to nature alone.

Interference with the cystoscope and employment of catheters to drain the kidney and to stimulate the passage of the stone by dilatation of the ureter are valuable and reliable means, not only in combating the distention and restoring the pelvis and the kidney to normal, but also in furthering the passage of the stone.

An interval of one month is too long to wait for cystoscopic treatment.

The absence of symptoms must not make us believe that the kidney is emptying itself.

It may only be during attacks of acute swelling of the ureter about the stone with increasing distention, or with the advent of a mild degree of infection, that attacks of colic are noted, the patient feeling well in the interim.

Two types of clinical course are encountered: those cases in which there is more or less constant pain, in which intervention of some sort is usually demanded for relief; and secondly, those insidious types whose manifestations may be absent. Absence of pain, therefore, must not be interpreted as indicative of the absence of hydronephrosis.

Treatment with the ureteral catheter should be given so as to prevent chronic hydronephrosis, both by emptying and dilating the ureteral channel, even if this does not move the ureteral calculus.

In every instance of positive calculus obstruction demonstrable either with the *x*-ray or with the cystoscope, cystoscopic treatment is in order, unless the stone is immediately passed within twenty-four to seventy-two hours.

Attacks of pain are usually an indication of retention of urine.

Continuous pain usually indicates complete retention.

The absence of pain after one or more attacks of ureteral colic does not imply the absence of renal distention, for chronic distention may exist with rare attacks of exacerbations, the latter manifestations being the only ones that arouse the interest of the patient.

Treatment should be given in the free interval, particularly if data are at hand that suggest that retention is present.

The author holds that the methods which have given him best results during the past ten years are: The employment of catheters and bougies in the ureter; the use of olivary dilators; and instrumental intravesical procedures to remove calculi from the intramural portion of the ureter by incision through the cystoscope or otherwise.

One should look askance upon the claims of those who would possess such unusual skill and such highly specialized cystoscopic instruments as to enable them both to seize and to extract a ureteral calculus when it lies above the bladder. Any radical means sufficiently intensive to extract by force an impacted calculus within the ureter above the bladder is not only incompatible with the mechanical possibilities in the bladder and ureter, but if possible would be dangerous to the integrity of this channel.

The author's olivary dilators are placed on a bougie furnished with a screw thread, which allows of from 5 to 15 F. being secured in place. Bougies are introduced through an operating cystoscope into the ureter; the lumen of this tube is gradually increased by successively passing tips of larger size. This method is applicable when the two-catheter method of dilatation is not successful in coaxing the stone beyond a certain point, and the lower ureteral channel is too narrow; and secondly, in the case of larger stones which have been long embedded. He has often induced the passage of calculi a centimeter in diameter. He cites an example of a stone half an inch in diameter, and long impacted in the intramural portion of the ureter, which was passed after cutting the upper ureteral lip.

Mortality from Syphilis.

The *Boston Medical and Surgical Journal* of March 2, 1922, thus comments on this topic:

Knowledge of the effect of syphilis on mortality is vague because the apparent cause of death overshadows the morbid underlying and sometimes etiologic influence of syphilis. For example, a person dies from a cerebral hemorrhage and the return of death so specifies, but the ruptured vessel may be the expression of a disease of which the effusion of blood is the end-result. In a series of autopsies conducted in the Central Islip State Hospital, Long Island, N. Y., syphilis was regarded as the direct cause of death in twenty-seven per cent, and as a contributory factor in five per cent more. Practically one-third of those dying in that

institution were syphilitics. It should not, however, be construed from these facts that syphilis causes one-third of the insanity of the country, for one may argue that the inherent instability in some mentally defective persons led to exposure, and the consequences thereof, but this large proportion of syphilitics does call attention to the importance of this disease in causing death, and should lead to a more scientific record of the etiologic importance of syphilis in reporting causes of death.

The Bureau of the Census for 1920 records only 7969 deaths from syphilis in the registration area, and the suspicion of inaccuracy in death returns is leading the United States Public Health Service to seek a basis for preparing more nearly accurate statements of deaths due to this disease.

Even pneumonia, acting as the immediate complication, has been used as a cause of death without qualifying explanation in cases which would have, in time, died of the syphilitic infection. So, also, tuberculosis, chronic nephritis, cancer, and many diseases of the nervous system, have been recorded without the real influence of syphilis appearing in the returns.

Although physicians dislike to put on a death return any statement relating to a disease which may give rise to adverse comment, one ought to remember that statistics are only of value in so far as they are true records.

Inguinal Herniotomy under Regional Anesthesia.

LABAT and MEEKER *(Surgery, Gynecology and Obstetrics,* March, 1922) describe a new method, called a field block.

Anesthesia is usually induced with 100 cubic centimeters of 0.5 per cent and 50 cubic centimeters of 1-per-cent novocaine solutions in separate containers. Ten minims of adrenalin solution 1:1000 are added to each 100 cubic centimeters. Less solution is used for a lean patient. If the patient is very obese about 50 cubic centimeters more of the 0.5-per-cent solution may be required, but in the average case a total of 150 cubic centimeters is never exceeded. The special regional anesthesia syringe and needles introduced by Labat are employed.

The patient is placed in the dorsal decubitus position and the skin prepared as for laparotomy. The operator stands on the side of the region to be anesthetized, and with the smallest needle an intradermal wheal is raised about 2.5 centimeters above and medial to the anterior superior iliac spine; this is called the parailiac wheal. A second wheal is raised just above the pubic spine; this is called the pubic wheal. The subinguinal wheal lies just below the inguinal (Poupart's) ligament and lateral to the femoral artery. With a needle 8 to 10 centimeters long and with an equal mixture of the 0.5- and 1-per-cent novocaine solutions fanwise injections are made down to the transversalis fascia in a plane perpendicular to the surface of the skin and extending from the crest of the ilium toward the umbilicus, the last injection being made just within the rectus sheath. A subcutaneous injection then made in this plane creates a wall of anesthesia which blocks the ilioinguinal, iliohypogastric, and lower two thoracic nerves. Injection should be slow, steady, and continuous, as the needle advances and is withdrawn. From 50 to 60 cubic centimeters of solution is used in this injection in the average case.

The needle is next introduced at the pubic wheal, and deep injections into the pubic attachment of the rectus muscle on the same side are made, extending a little beyond the middle line, with about 5 cubic centimeters of the solution. Through the same wheal injections are made along the horizontal ramus of the pubis to a point 3 to 4 centimeters beyond the middle line, about 5 cubic centimeters of solution being employed for this also in the average case. The needle is next introduced at the subinguinal wheal, and deep injections are made underneath the inguinal ligament, followed by subcutaneous injections parallel with and along this ligament. The purpose of this injection is to control overlapping branches coming from the anterior crural

and external cutaneous nerves and permit greater pull on the inguinal ligament in the approximation of the deep layers. About 10 cubic centimeters of the 0.5-per-cent solution is needed for this.

If the hernia reduces spontaneously in the supine position, or if reduction is maintained after taxis, the cord structures are next grasped between the thumb and index-finger of the left hand at the external ring, or at the point the cord crosses the pubis, and the needle inserted through the pubic wheal. The position of the operator for the injection of the cord depends on the side to be injected, the injection being best made from the pubic spine upward. The cord structures are transfixed and injected with about 5 cubic centimeters of the 1-per-cent solution, care being exercised not to traumatize the cord structures by multiple punctures, causing hematomata, which, however, are of no clinical importance. The cord is then massaged a little so as to hasten the diffusion of the solution.

The last injections are made at the margins of the internal ring. If the internal ring is easily found by the palpating finger, the needle is advanced from the pubic wheal in the subcutaneous tissue to a point just medial to the margin of the ring. The fascia is then perforated at this point and the injection made. Similar injections are made above and lateral to the margins of the internal ring, 5 to 10 cubic centimeters of the 1-per-cent solution being used. If the internal ring cannot be located by palpation, the injections are made midway between the pubic and anterior superior iliac spines about 2.5 centimeters above the inguinal ligament. These injections surround the neck of the sac and are meant for blocking the genitofemoral nerve, but failure to anesthetize this nerve occasionally happens, thus necessitating its injection after exposure of the cord.

Occasionally the reduction of the hernia is not maintained of itself, even with the patient in the supine position, the mass reappearing as soon as the pressure is released. In such cases reduction is maintained with the last three fingers of the left hand while the cord is grasped with the thumb and forefinger and injected as previously described. The injections around the internal ring are here best made from above through the parailiac wheal in order to prevent a possible puncture of the sac and its contents.

An illustration is given of the bilateral block, which is based on principles described for unilateral herniotomy. The quantity of solution is 200 cubic centimeters of the 0.5-per-cent and 50 cubic centimeters of the 1-per-cent, with 20 drops of adrenalin in all. If more solution is required for very obese patients, the 0.5-per-cent solution is preferable to the 1-per-cent. The operation should be started on the side first injected. The results are identical with those obtained from unilateral block. Spinal novocainization is much easier and quicker, but the duration of the anesthesia is only from one to one and a half hours.

In irreducible hernia a different technique is employed to meet the resulting distortion of the region. The wheals are raised at exactly the same points as in cases of reducible hernia, unless the deformity of the region renders palpation of the pubic spine impossible, in which case the pubic wheal is raised on either side of the hernial mass, but always level with the pubic bone. The third is at the lateral margin of the hernial mass just below the inguinal ligament and lateral to the femoral artery.

Injections through the first parailial wheal, located about 2.5 centimeters above and medial to the anterior superior iliac spine, are made essentially as already described. Injections through the second wheal are made along the horizontal ramus of the pubis and in the pubic attachment of the rectus muscle on the same side, but great care should be exercised not to transfix the hernial mass. Injection of the cord through the pubic wheal is not safe unless the parts held between the thumb and index-finger are composed essentially of the structures of the cord. If there is any

doubt of the presence of the sac among the structures grasped, deep injections, as well as subcutaneous injections, are made on both sides of the hernial mass, retracting the mass with the left hand to avoid its puncture. The cord is injected after exposure. Usually the genitocrural nerve cannot be injected from the pubic spine, but the neck of the sac is infiltrated; other injections are seldom necessary after exposure of the sac.

A diminution in sensibility to pain accompanies strangulations. This is probably due to compression of the nerves and alteration in the blood supply of the strangulated area. Simple infiltration along the line of incision is all that is necessary; deeper injections depend on the pathological changes of the hernia and of the surrounding structures.

The same procedure is used as for unilateral inguinal herniotomy, but in old inguinoscrotal or sliding and recurrent hernia the cord structures are particularly difficult to block. It is, therefore, best to inject them after exposure unless the injections at the internal inguinal ring from the parailiac wheal have been successful. With the inguinal incision it is not necessary to circuminject the base of the genitalia, as proposed by Braun, Pauchet, and others. Spinal novocainization is preferred in these cases, and when properly administered is as safe as the regional field block.

There are no contraindications to the use of regional anesthesia except possibly in the very young patient. The regional method is particularly indicated in patients who have cardiac troubles, nephritis, pulmonary disease, or any other condition that is not favorable to general narcosis, such as high blood-pressure and diabetes. In the excessively obese patient spinal novocainization is preferable, because of the difficulty in injecting the deeper structures through the fatty layers. For strangulated hernia, regional or local anesthesia is imperative, since the patient is in a very bad condition generally, and the added load of one-half hour to an hour under ether certainly should be avoided.

Tennis Elbow.

Osgood *(Archives of Surgery,* March, 1922) states that tennis elbow, epicondylitis, or epicondylalgia presents a fairly typical syndrome, occurring in connection with certain sports, most commonly with tennis, and in various occupations and in lead poisoning. The right arm is more commonly affected than the left. This condition occurs more often in men than in women, but it is typical in both sexes.

It seems to be most frequently caused by strenuous or repeated extension of the arm in a flexed position, meeting a sudden opposition to further extension, as in a backhand stroke in tennis, fencing, or in boxing, or by striking blows with a hammer with the arm in a cramped position, by the punching and lasting of a shoemaker, by the slinging of mortar by the mason. It is possible that an infection or toxin may be the etiologic factor in certain cases.

The essential pathology is believed to be an inflammatory reaction in a commonly existing bursa, varying in size, and located beneath the conjoined tendon of the extensor muscles between this tendon and the tip of the epicondyle, the origin of the supinator radii brevis muscle, and the radiohumeral joint. Somewhat similar symptoms occasionally referred to the mesial condylar region may be explained by similar areolar tissue reactions beneath the common tendon of the flexor muscles. No constant bursa has been found in this region, but adventitious ones may well occur.

Heretofore the only method of treatment which has been generally successful has been complete immobilization for six weeks. Untreated, the discomfort may persist indefinitely; but it is usually self-limited, recovering in from three months to a year. The operation of splitting the conjoined tendon, opening the bursa, evacuating the contents, and curetting its walls is not likely to do harm; and in two cases it has been followed by a rapid subsidence of symptoms and free use of the arm.—*American Journal of Surgery,* May, 1922.

Anesthesia in Intracranial Surgery.

MENNELL concludes a paper before the Section on Anesthetics of the Royal Society of Medicine which is thus abstracted by the *British Medical Journal* of April 1, 1922:

"After referring to the effect of changes in intracranial pressure which come about quickly or suddenly, Dr. Mennell briefly depicted the methods of anesthesia in cranial surgery during the last twenty years at the National Hospital, Queen Square. The danger of chloroform, which was at the beginning of that time commonly employed, was explained by the much higher percentage necessary in the blood for anesthesia when the intracranial pressure was raised. Directly the tension was relieved an enormous increase took place in the volume of blood flowing through the brain. A dangerous or even lethal dose might suddenly bathe the medullary centers. Anesthesia deepened directly the dura was opened, whatever anesthetic was being used. Ether was subsequently substituted for chloroform in the Vernon Harcourt inhaler, and later still it was given from a Junker bottle attached to an oxygen cylinder. Mechanical difficulties led to the substitution of infusion anesthesia for these inhalation methods. The technique was tiresome and the method expensive. However, hedonal gave good results till the war rendered it unobtainable.

"Dr. Mennell drew attention to the deceptive rise of blood-pressure due to constant supply of fluid with infusion methods of anesthesia. From these methods he passed to intratracheal ether, which he now considers the best method for all cerebellar, pituitary, or high spinal operations. The extreme flexion of the neck required for some of these operations can be permitted with no other method of anesthesia. No sudden fall of blood-pressure occurred if hemorrhage was properly controlled. The surgeon can operate without haste and the most formidable cerebral operations can be completed at one sitting. Vomiting, which led to protrusion of the brain and venous hemorrhage, can be more certainly avoided than by any other method.

"With temporal or parietal operations Dr. Mennell frequently gave ether and oxygen by means of a Junker inhaler. The intratracheal method was less necessary in these cases. Any attempt at swallowing was regarded as an indication to increase the strength of the ether vapor. A quickening of the pulse always preceded a fall in blood-pressure. Removal of tumors from the cerebellum or lateral recess often caused serious trouble through direct disturbance of the medullary centers. A transitory severe fall in blood-pressure commonly occurred. The method employed by Mr. Sargent of removing these tumors by a suction apparatus greatly lessened the danger. The radial pulse might be impalpable for as long as twenty minutes without serious harm resulting. The lighter the anesthesia could be kept the better.

"Dr. Mennell next described the manner in which he used chloroform for an anesthesia to permit the injection of alcohol into the fifth nerve, gave some statistics of his experience with intracranial operations, and demonstrated the apparatus which he employs."

The After-results of Colectomy.

MOYNIHAN *(British Medical Journal,* April 1, 1922) contributed to the proceedings of the Royal Society of Medicine a summary of his records of sixty cases of primary colectomy and eight of ileosigmoidostomy. Two colectomy cases died as the result of operation.

Among thirty-seven traced cases of colectomy there were fifteen in which the patients gained weight, felt well, and were able-bodied. All who improved had suffered, as proved by operation, from gross mechanical difficulties. In sixteen of the cases results were reported as fair. In six cases the results were poor or bad.

In six traced cases of ileosigmoidostomy

there were two good results, one fair, one not good, in two poor. In one of the latter complete colectomy was afterward performed, without improvement.

Keith in commenting upon this subject observed that as the result of Metchnikoff's teaching there arose a belief to the effect that man would be better without a colon. He called attention to the fact that the important part of this tubule was the submucous coat, really a great laboratory, by means of which the food might be absorbed and made available for use in the body. He examined 15 colons excised by Moynihan and found 10 or 11 were of the soggy type.

Hurst suggested that colectomy was a passing fashion. At Guy's Hospital 37 such operations were performed from 1904 to 1908, and 50 from 1909 to 1913; the operation since then had become increasingly rare, and only one such operation was performed in 1920, and none at all in 1921. The mortality of the operation was 16.5 per cent. He had never known a patient to die from intestinal stasis. He believed if most of these cases are treated intelligently and persisted in they will get well.

Pauchet sent a communication in which he stated that he had done 122 operations for short-circuiting with eight deaths; 52 total colectomies, with six deaths; and 22 right-sided colectomies, with one death. There were no fatalities with the two-stage operation. At present, out of 10 colectomies 9 operative successes might be reckoned on, and one death; of the 9, results were good in 3, fairly satisfactory in 3, and poor in the remainder.

Lane expressed concurrence with Hurst in the view that colectomy is incident to the ignorance and incompetence of physicians. In answer to the assertion that people with intestinal stasis, who are left alone, do not die, he told of a lady who came to his office with a revolver and announced unless he took out her colon she would shoot herself. The risk of the operation varies with intra-abdominal tension. In the flaccid female it is without risk. As for the operation being obsolete, he is removing more colons than ever before.

Slesinger reported 50 cases, with two operative deaths. He has been able to trace 25, 18 of whom are perfectly well.

Pneumococcal Peritonitis.

McCartney and Fraser *(British Journal of Surgery,* April, 1922) discuss the mode of infection, which begins as a rule in the pelvic peritoneum and is carried by the blood stream. It is an infection peculiar to the female in its primary form and probably rises as the result of infection along the genital tract. It is commonest in the fifth and sixth year of life. The total mortality is somewhere over 80 per cent.

Early operation affords the best prospects for recovery. As soon as the condition is recognized, drainage of the peritoneal cavity is carried out under gas and oxygen anesthesia. The drainage is at the most dependent point, and some of the best results have followed vaginal drainage. Until the period of the last year the early drainage operation might be said to summarize their line of treatment, but during the past twelve months they have improved the position by the addition of blood transfusion. This adjunct has already improved the post-operative results, and in the future they look forward to a greater reduction in the mortality. The transfusion is done by the citrate method, and the parents, if suitable, act as donors. It is important to recognize the precise time at which it can be done with the greatest possible advantage. That point is when evidences of septicemia are just beginning to make their appearance. This is very definitely the period of election; if done earlier the transfusion does not appear to prevent the onset of the septicemia; if done later the heart may be so weakened that the quantity of blood which can be safely introduced is so small that relatively little beneficial effect can be looked for.

As regards the quantity of blood which can be given to a child, say, of six years, the authors aim at the administration of

250 cc of blood. The change which the administration induces is often dramatic—the cyanotic tinge disappears and is replaced by a healthy, rosy color, the restlessness abates, the pulse-rate slows, and the patient often drops into a sound sleep.

Perhaps the most striking testimony to the value of blood transfusion in pneumococcal peritonitis is evidenced in the following mortality figures:

Taking the total number of cases operated on at the Children's Hospital during the past twenty years, the mortality figure averaged 65 per cent. During the year 1920 the mortality figure was 53 per cent, an improvement which they ascribe to earlier recognition of the cases, to earlier operation, and to more suitable methods of anesthesia. During the year 1921, in which blood transfusion had been adopted as a routine at the critical stage of the disease, the mortality figure fell to 42 per cent.

Pituitrin in Inoperable Cancer.

NORGATE *(British Journal of Surgery,* April, 1922) has used pituitrin in 36 cases of inoperable cancer; sometimes driving the injection directly into the cancer, sometimes placing it as near as seemed practicable. He notes that in twenty seconds the patients experience severe pain in the back or abdomen, and a sensation of squeezing the growth, followed by an anemia which may be alarming, and weakening of the pulse, but relieved by brandy in case of need, preferably to be untreated. He has used the Ferris & Co. and Parke-Davis preparations, and notes a relief of pain in many cases.

He has given 5 cc in enteric hemorrhage in twenty-four hours without ill effect, but has not gone beyond 3 cc per week in cancer cases. He has had no deaths for a week after injection. There is nearly always an increase in appetite and strength and weight. There has seemed to be a delay in the onset of secondary gland troubles and a tendency toward abortion of the growth; nor have there been observed secondary deposits in other parts of the body. It is especially commended as a means of controlling hemorrhage. It delays growth by cutting off the blood supply and gives the patient further time on this earth. It also seems to have a beneficial effect upon the cachexia.

Drainage in Abdominal Emergencies.

CHURCHILL *(British Medical Journal,* April 15, 1922) reports on 75 cases treated in the line of limited interference. The patients were among the working class in the large industrial towns, and as a rule not sent to the hospital until several days after the beginning of the symptoms. The author has admitted four cases, which died within twenty-four hours of entering the hospital. As to his method the indication for drainage was thick pus, free pus, or thick purulent fluid. There was no handling of the abdominal contents, nor irrigation. But a single tube was used, this being placed nearly always in Douglas's pouch. The patient was put in the Fowler position, with the upper end of the bed raised on blocks three feet high. Among the cases treated were those of general peritonitis and perforation of the stomach and duodenum. The incision was usually right paramedian, above the umbilicus in the gastroduodenal cases. In the majority suffering from acute appendicitis, McBurney's gridiron incision was used. Two deaths are reported out of 75 cases. But two of the cases had secondary abscesses forming.

The main point of the author's paper is to urge that unlimited drainage is unnecessary, that restricted drainage will do all that is needful, provided the patient be put in the right position.

Bone-grafting and Bridge-grafting.

PAGE and PERKINS *(British Journal of Surgery,* April, 1922) thus report on a study of this subject illustrated by *x*-ray pictures:

From the evidence of radiograms it would appear that bone implants possess and retain a vital activity for some period independent of the tissues of the host.

Boiled beef-bone cannot be used success-

fully as a bridge-graft; it is, however, valuable if employed as an internal splint.

For successful bridge-grafting the graft should be autogenous. The most satisfactory source for most purposes is the tibia. The graft should contain sufficient compact bone for strength, and as much cancellous bone as possible. It is in relation to the cancellous part of the graft that firm union with the host-bone takes place, and that new bone is laid down to thicken the implant in the first few months after implantation. The presence or absence of periosteum on the graft does not appear to affect its vitality or its later enlargement in response to function.

Two steps are necessary in the preparation of the host fragments: (*a*) Removal of the sclerosed ends till healthy vascular bone is exposed; (*b*) mobilization of the fragments so that they can be normally aligned without tension.

The most important factor governing success is the firm fixation of the graft into both extremities of the host-bone.

The method of fixation of the graft found most satisfactory for the average case is by intramedullary pegging at one end and by an inlay splice at the other.

Fractures of the graft fall into two categories: (*a*) Apparent fracture at the junction of the host and graft; these fractures occur at an early stage, and are due to the weakening of the implanted part of the graft by absorption which results when it is not in firm contact with a healthy section of host-bone. (*b*) Fractures in the free part of the graft; these occur from inadequate support of the limb after the implanted ends of the graft have become firmly incorporated with the host-bone.

Postoperative treatment may be divided into three clinical stages: (*a*) During the first six weeks absolute immobilization of the part involved; during this stage the graft unites firmly with the host-bone. A radiogram taken at this period will show whether or not the graft is successful; if implantation of the graft has been so carried out that vital continuity between it and the host-bone becomes established, no space is seen between the graft and the host-bone in the picture; if fixation has not been firm, a clear area is seen between the graft and the host-bone, and the related part of the graft will become gradually absorbed, and finally give the appearance of being fractured where it is in contact with the host-bone. (*b*) After six weeks, partial function of the limb involved is allowed, adequate splint support being supplied to prevent fracture from undue strain. (*c*) When the graft in response to function has sufficiently thickened, all support is removed, and the return of full nutrition and activity in the limb is assisted by physiotherapy.

The ease with which successful bridge-grafts can be carried out varies in different bones. The radius gives the largest proportion of successes. The upper third of the ulna and the lower third of the tibia have been found to be the most difficult.

The authors attributed most of their failures to unsatisfactory fixation of one end of the graft to the host-bone.

Postoperative infection of the wound is not incompatible with the survival and growth of a bridge-graft.

Some Remote Effects of Tonsillitis.

PAVEY-SMITH *(The Practitioner,* April, 1922) in this communication deals with the tonsil as an effective focus, and when he uses the term tonsillitis indicates not necessarily the acute or obvious condition, but simply an infected state, usually chronic and symptomless. He takes up, first, certain forms of chronic arthritis and holds the tonsil not only responsible for this but for endo- and pericarditis, chorea, myositis, fibrositis, nephritis, toxic neuritis, osteomyelitis, appendicitis, pneumococcal peritonitis, infectious jaundice, pulmonary gangrene and tuberculosis, cervical lymphadenitis simple and tuberculous, septicemia, arteriosclerosis, general debility, neurasthenia, and aprosexia. Nor is this arraignment yet finished, since he believes that this organ may be a portal of infection in scarlet fever, measles, and poliomyelitis; and

even when healthy may be a diphtheria carrier.

Bearing on arthritis and the tonsil, he quotes certain laboratory experiments done upon rabbits with intravenous streptococci obtained from throat exudates. He speaks of the frequency with which the hemorrhagic streptococcus has been found in tonsils; also viridans. He notes that 60 per cent of all tonsils examined showed primary tuberculous foci. He alludes to the work of Dr. Benjamin Rush, who reported the relation between chronic arthritis and an infective focus 120 years ago. He quotes the *Bulletin of the Johns Hopkins Hospital* to the effect that the tonsils were removed in 91 cases of chronic arthritis with periarticular changes predominating. Thirty-one of these were followed up; 24 of these 31 had normal joints. The result in rheumatic fever was quoted as good; in chorea as less satisfactory. Tonsillectomy performed on 18 cases of nephritis showed that of 16 followed up 13 had normal urine eight months to 3½ years after operation. Lillie and Lyons are quoted from the Mayo clinic to the effect that of 200 cases of chronic arthritis and myositis in which tonsillectomy was performed, 159 were better twelve to eighteen months after; of 154 not able to work steadily before operation, 118 afterwards were able so to do.

As to the diagnosis—in other words, the determination as to whether a particular tonsil is acting as a focus or not—the author speaks as follows:

"The history cannot be depended on; but careful inquiry must be made about sore throat and quinsy. A word of caution with regard to this. Many patients admit to sore throats which, on closer questioning, turn out to be laryngeal, and in no way connected with the tonsils. Again, a distant attack of tonsillitis may have been forgotten, or, more commonly, the patient is inaccurate. Further, a history of tonsillitis is by no means an essential feature of chronic tonsillar infection. This lack of symptoms and history is a familiar feature of other focal infections.

"A positive history, therefore, especially if bearing a definite time-relation to the systemic disease, is strongly suggestive; but a negative history is no guide.

"The size of the tonsils, both apparent and real, conveys little information. Enlargement is certainly no criterion of the extent of infection. A highly infective tonsil may be almost invisible, and a conspicuous one innocent.

"A more reliable sign is redness. If this is limited to the tonsil and its immediate surroundings it may be taken as definite evidence of tonsillar infection. In some cases there is only a vertical red streak on the anterior pillar, the rest of the mucous membrane of the mouth and throat being normal in appearance. This red streak is often little more than ⅛ inch wide, but runs the whole length of the pillar. Sometimes it takes the form of minute dilated vessels. From my own observation I believe this to be a sign of chronic tonsillar infection.

"A more general redness of the fauces and pharynx is more suggestive of oral or nasal infection.

"The condition of the crypts is of great importance. In some instances caseous débris can be seen at the crypt orifices. This is exceptional. In most cases the tonsil must be squeezed. This is best done by holding the tongue down near the base of the tonsil with one spatula and pressing just in front of the anterior pillar with another. A good light is essential. This movement rotates the tonsil inward and forward and, at the same time, compresses the deeper part. Fluid pus can in this way often be expressed from a tonsil which at first appears comparatively healthy. Occasionally it is found that the crypt orifices bleed, even on moderate pressure, after the pus has been expressed. This I regard as evidence of granulations lining the crypt.

"Small masses of whitish material can often be squeezed out of the supratonsillar fossa without much difficulty. These generally consist of food débris, and, apart from occasionally causing slight local irritation, are of no significance.

"Tenderness of the tonsils is unusual, but if present is suggestive.

"Enlargement of the tonsillar gland is definite evidence of infection. I have already described its relations and position. It may be difficult to find, especially in a fat or muscular neck; but if it can be felt it is enlarged. Enlargement of the other cervical glands, and scars of former abscesses in this region, though not such definite evidence, are suggestive.

"These are the main points in diagnosis. Several of them are equivocal and often absent from the picture. The evidence for and against the presence of a focus must be carefully weighed in each individual case before a decision is made.

"Bacteriological investigation of the tonsil *in situ* is of little use. Surface cultures are valueless, and deep cultures impracticable. Again, as previously mentioned, the streptococcus is no uncommon inhabitant of the crypts in health.

"Confirmatory evidence of the presence of a focus may be obtained by the glucose tolerance test. Pemberton and Foster working on this test in cases of chronic arthritis found the normal sugar curve restored after removal of septic foci in the teeth and tonsils. They suggest that the metabolic condition is secondary to the septic process.

"Before making a final decision it is important to complete success to make sure that the tonsil is not only *a* focus but *the* focus. This can only be done by excluding other possible sources of infection. Tonsillectomy is likely to be only a partial benefit if septic teeth remain in the mouth. Conversely, disappointing results following the removal of obviously septic teeth may find their solution in the tonsils. Accessory nasal sinusitis and otitis media may be present, and foci may exist in the alimentary and genito-urinary tracts. These must be excluded as far as possible before all the blame can be laid on the tonsil.

"Treatment must, in the present state of our knowledge and experience, be summed up in tonsillectomy—that is, complete enucleation. In many cases it is difficult; the tonsils are small, fibrous, and adherent, and must be dissected out. In only quinsy cases, in which the capsule has been transgressed, the adhesions are likely to be very troublesome. In chronic arthritis cases care must be taken that the affected joints are not injured while the patient is under the anesthetic, and the muscles are relaxed."

Use of Iodine in the Treatment of Wounds.

COLCORD *(International Journal of Surgery,* April, 1922) thus summarizes a study of this matter:

Iodine destroys a layer of tissue over the wound surface without selection. This must be removed before healing can begin, and furnishes a favorable culture medium for bacteria.

The teaching that every industrial wound is potentially infected is misleading and has done harm. With proper cleansing and debridement almost every such wound will heal without clinical infection. The body cells and fluids can take care of the usual bacteria remaining. Do mechanical debridement with forceps and knife or scissors; follow with chemical debridement with sodium hypochlorite solution.

The use of this solution may be varied according to the severity of the wound.

In slight wounds, pour on the outside of the dressing without skin protection or tubing.

In wounds of moderate severity, use a short rubber tube without tying or punching, protecting the surrounding skin with sterile vaselin. Patient applies the solution with a medicine dropper every two hours.

In severe lacerated wounds, use the Carrel technique.

Employees should not be permitted to treat wounds where well-equipped dressing stations and trained nurses or surgeons are available. The teaching by Mock, Red Cross and others to use iodine before sending the case to the doctor is pernicious and creates would-be doctors, increasing the frequency of infection.

When wounds are received far from doctors or dressing stations, where several hours must lapse before a surgeon or trained nurse can be seen, the iodine dressing of

wounds by trained laymen is permissible, but these cases should be sent to the surgeon as soon as possible.

Iodine is a lazy man's dressing, and its use usually accompanies a faulty technique. Figures such as Lee's at the Cramp Ship Yards prove it far inferior to Dakin's solution, Ochsner's fluid, or dichloramin-T. Silver nitrate, bichloride of mercury, iodine and carbolic acid coagulate albumen and favor infection. They also, by this very coagulation, block up the lymph channels and so prevent the outpouring of lymph into a wound, so necessary for its germicidal powers.

Clean technique, thorough cleansing, proper suturing, drainage, splintage and rest are the things that have saved thousands of lives and limbs in the World War. They are ideal in industrial surgery.

Good surgery comes as much from the heart as from the head. Let the industrial surgeon love his work; let him get the aseptic conscience; let him be filled with zeal to save life, prevent suffering, and restore function, and he may be trusted to develop a technique and seek out the best remedies.

The Peptic Ulcer.

MONSARRAT *(British Medical Journal,* April 8, 1922) observes that the surgeon has found a safe means of dealing radically with peptic ulcers. He questions the immediate cause, and has at least guessed at the remote cause. Radiology has made the diagnosis reasonably certain. He reports some 48 cases operated on in 1921. There were 34 gastric ulcers, 8 duodenal and 6 jejunal. Incidentally he alludes to adhesions which involve the stomach and expresses himself as greatly impressed with the interference in function which such adhesions cause and the simulation of visceral diseases incident to this functional change. He operated on four such cases, the patients being incapacitated for gainful occupation, and found the adhesions chiefly between the anterior abdominal wall and stomach. These adhesions were all incident to scars of operations which had been performed for either gastric or duodenal ulcer. The treatment consisted in utilizing an omental flap after dissecting the stomach loose. The result was complete relief of the pain, which had been associated with digestive movements and exercise.

In four cases of pylorospasm simulating ulcer pyloroplasty was performed, with relief of symptoms. In two the radiological diagnosis was ulcer, in one the report was "marked delay," and in the fourth the stomach was stated to be normal in outline and function. Two cases of perforated duodenal ulcer were treated by infolding suture, gastrojejunostomy, and pelvic drainage. The ulcers of the lesser curvature were treated by excision, either with or without gastrojejunostomy; the latter procedure is preferable. There were ten cases of posterior gastroenterostomy, the lesions being duodenal in six, gastric in three, in one pyloric stenosis. There were two cases of transgastric suture of ulcer. In one of these the ulcer lay high near the cardia, and could be reached only through a gastrotomy.

There were twenty-five cases treated by partial gastrectomy. In three cases the operation was a "sleeve" resection; in the remainder resection of the stomach from the pylorus to beyond the ulcer-bearing area, closure of the duodenum, and anastomosis of the stomach wound to the jejunum through a mesocolic gap.

There were six cases of jejunal ulcer, subject to different surgical procedures. The ideal one is division of the pylorus, closure of the duodenum and resection of the stoma, and closure of the gastric and jejunal wounds left by this resection. The pyloric half of the stomach is then resected and the stomach wound anastomosed to a jejunal loop at a point about eighteen inches from the jejunal commencement. In the forty-eight cases there was no mortality.

In the case of peptic ulcer resistant to other forms of treatment, surgery is required. The author is willing to concede that many ulcers may heal under medical treatment. He attributes the development of ulcer to altered gastric secretion and altered gastric rhythm.

The stomach consists of two segments, a fundal segment and a pyloric segment. The chemistry of these two segments may differ materially at any given moment: the fundus is occupied with salivary digestion in the early stages; the gastric secretion poured out from border cells and gland cells accumulates in the pyloric segment, and it is here that peptic digestion takes place. Langley compares the peptic activity in the pyloric segment with that in the fundal segment as 73 to 1. The pylorus is not a closed orifice during normal digestion. Quite early in the process small quantities of gastric juice and food pass into the duodenum, and in the cells of the duodenal mucous membrane the hormone of pancreatic secretion is formed. There is also a regurgitation of pancreatic secretion into the stomach. Rehfuss, using trypsin as an indicator of this regurgitation, has shown that it is regularly associated with normal digestion, and that the trypsin value is high in the presence of low acidities and low when the stomach contents are of high acid concentration. Boldyreff believes that gastric acidity is lowered to an optimum by this passage of pancreatic fluid. However that may be, pancreatic secretion, which on the one hand is evoked by the gastric secretion, on the other hand acts as a regulator of the activity of peptic digestion. There is thus a correlation, diphasic, between gastric secretion and pancreatic secretion. This correlation is dependent on an intact pyloric mechanism. We must not indulge the notion that it is the free acid of the gastric juice which is the nocuous agent in producing gastric or duodenal ulcer. Free hydrochloric acid is absolutely innocuous in the concentration in which it is met with in normal or pathological stomachs. It is merely a rough indicator of peptic activity; in fact, it can hardly be said to be even this, for the ratio of peptic power is not proportional to the acidity. What we can say is that, generally speaking, peptic attack only occurs in an acid medium.

It would appear, then, that we can find in derangements of the gastropancreatic correlation a sufficient explanation of the incidence of peptic ulcer (given a peptic secretion of high activity), and also reasons for its varying site. We have at present incomplete knowledge of the conditions which set up these primary functional disturbances; they themselves do not appear to be dependent on the chemistry of the gastric secretion, for hypersecretion and hyperchlorhydria are usual both in the hypotonic stomach of gastric ulcer and the hypertonic stomach of duodenal ulcer. We do know, however, that visceral disease elsewhere—for example, in the appendix and gall-bladder—may be connected with such functional gastric disorders, and that the latter may disappear after surgical treatment of the focal disease.

The surgical remedy for duodenal ulcer is posterior gastrojejunostomy. The anastomosis between stomach and jejunum must measure three inches in its long diameter, and it must encroach on the pyloric segment of the stomach. Some surgeons add to the gastrojejunostomy an excision of the ulcer, others add occlusion of the pylorus. Failure to obtain permanent relief by gastrojejunostomy is so exceptional that to add either the one or the other appears to be unnecessary.

In gastric ulcer healing is most certainly brought by removal of the ulcer. Can gastrojejunostomy be relied on to so remedy the stasis in the stomach and the peptic activity of the gastric juice that ulceration will not recur? Certainly ulcer excision alone is not sound, and gastroenterostomy alone cannot be relied on, and even in combination the results are by no means uniformly good.

Sleeve resection has only a limited field; it is the operation of choice for midgastric cicatrized ulcer. In the presence of active ulcer it is open to the same objection as simple ulcer excision, in that it does nothing to modify the chemistry of the gastric secretion.

Partial gastrectomy combined with a gastrojejunal anastomosis does two things: in the first place, it removes the ulcer and the ulcer-bearing area; in the second place,

it renders the stomach incontinent and prevents finally the accumulation of a nocuous gastric secretion.

This operation is well borne. The most important points in the technique are: first, such infiltration anesthesia as to give satisfactory relaxation; second, sound closure of the duodenum; third, great care in suture of the stomach to the jejunum with small suture gaps; fourth, a watchful hemostasis throughout. In the cases recorded the postoperative recovery was free from complications, from undue shock, from hemorrhage, and from vomiting. The postoperative treatment is as follows: Sterile water is given at once and the patient is encouraged to suck formalin tablets—they allay thirst and keep the mouth clean; on the second day milk, sterilized and alkalinized; on the third day an egg, beaten up and divided, is added, and on this day medicine is started for the purpose of controlling the activity of the gastric juice—it contains bismuth carbonate, magnesia ponderosa, and tincture of belladonna. As the diet is increased powders are given in addition, consisting of calcium carbonate and magnesia.

Summary of Recent Progress in Urology.

Braasch *(Minnesota Medicine,* May, 1922) in an article thus headed submits a number of advances: first in order submucous ulcer of the bladder, this being a localized infection and named ulcer unfortunately, because there is really no evidence of actual ulceration. The cystoscopic picture is one of congestion and cicatricial contracture, sensitive and readily bleeding; commonest in women and mostly placed in the upper part of the bladder. The treatment is at first topical by silver and fulguration; in the areas resistant to treatment localized excision may be serviceable. Incidentally foci of infection, particularly in reference to the teeth and tonsils, should be eliminated.

As to stone in the ureter, Crowell is quoted to the effect that it is rarely needful to operate, this surgeon having been called upon to use the knife only twice in a series of 78 cases. Bugbee notes that the operation was called for in 25 cases out of a series of 120. The Mayo Clinic reports 25 per cent needing operation.

The most important advance in urethral removal of the obstruction is incident to the method of dilating the ureter by means of multiple indwelling ureteral catheters. First one instrument is introduced beyond the stone, and thereafter a number are passed and left in place for a day or so. The subsequent colic usually expels the stone.

The importance of foci of infection as causative factors in involvement of the urinary tract is clearly indicated. An experiment is quoted to the effect that streptococci obtained from a patient suffering from recurring lithiasis and injected into the pulps of teeth of six dogs resulted in the formation of renal stones in five.

As for radium, the effects of its use as applied to the urinary tract have not been largely encouraging. The best results have been obtained by the insertion of needles of radium emanations. These should not be put too close together as otherwise sloughing will result. In carcinoma of the bladder some benefit has ensued through a suprapubic opening and the insertion of these glass tubes containing radium emanations two or three weeks before operation. As a result the neoplasm will contract and show well-marked borders. Radium applied to the operative area after removal delays healing and at times causes sloughing of the tissues, with serious results.

Braasch points out those of the bladder epithelioma are least malignant in which the cells exhibit the structural characteristics of those of the surrounding normal cells. The most malignant are those in which there is a structural mass of irregular cells, these being the solid epitheliomata.

He regards caudal anesthesia as of value in the use of the cystoscope, the application of fulguration, litholapaxy, dilatation of

strictures of the urethra, and the introduction of radium needles into the prostate.

Sodium bromide is praised as a pyelographic medium, the resultant shadows being dense, and this solution being free from the objection which obtains against others.

Under the heading of decompression of the bladder Braasch states that experience has shown that the rapid and complete emptying of the bladder by catheter or suprapubic drainage is attended by a high mortality rate, nor was this prevented by the usual gradual emptying and replacement by boric acid. The gradual emptying, as described by Van Zwalenburg, is serviceable since as applied in 100 cases but one fatality resulted. The technique is as follows:

"The patient is placed in a hospital and made comfortable in a warm bed. A soft-rubber catheter is introduced into the bladder with all aseptic precautions and fastened in place without permitting the escape of urine. This procedure is possible except in occasional cases in which the catheter must be passed on a metal guide. In these cases a minimal loss of urine occurs, usually from 10 to 15 cc. The catheter is then connected to a six-foot rubber tube which is connected at its distal end with one arm of a Y glass tube. The other arm of the Y tube is hooked over the edge of a receptacle hung at the foot of the bed. When all is connected the clamp is removed from the catheter and the height of the urine receptacle is adjusted to a level at which the urine will just trickle over into it on deep inspiration. The tube is clamped when the patient is fed and bathed, or when any movement is to be undertaken which will disturb the relative level of the bladder and the outlet. The receptacle is lowered 2.5 cm. each day until the bladder has emptied itself, or until the level of the outlet is approximately that of the bladder. When this level is reached the bladder is usually almost, if not quite, empty. However, if 100 or 200 cc of urine remain, the intravesical pressure is reduced to *nil* and there is no danger in completely emptying the bladder."

Renal fluoroscopy at the time of operation for renal stone has proved to be of great practical value. This procedure is an adaptation of the portable army roentgen-ray unit so that it can be employed at the operating table. The surgical treatment of renal lithiasis is often unsatisfactory because of complications: (1) The difficulty of exactly interpreting the roentgenogram; (2) the difficulty of locating the stone in the kidney; (3) the inability to find the stone; and (4) the possibility of fragments of stones breaking off or being loosely connected with the original stone. By employing fluoroscopy of the kidney at the operating table these difficulties, with the embarrassing results of failure, may readily be obviated. The kidney is brought up out of the wound as far as possible, thus permitting easy fluoroscopy. In about fifty operations in which the method has been tried it has proved to be of considerable practical value. In several instances the stone was not found in the kidney until detected by the fluoroscope. In two instances the fluoroscope demonstrated that a stone clinically diagnosed as intrarenal was extrarenal. In several cases after one or more stones had been removed additional stones were demonstrated.

Selenium in Surgery.

GILLETT and WAKELEY *(British Journal of Surgery,* April, 1922) have conducted a series of trials with a one-time vaunted specific and conclude:

Temporary improvement is the most that can be expected.

To obtain temporary improvement small doses are essential, the number of injections being limited to eight or ten.

Pain and insomnia are aggravated in most cases. On these grounds, or because of the severity of the local reaction, the injections have to be suspended.

The weight of the patient follows the same course as in every malignant lesion. They have never seen the gain in weight noted by other observers.

Reviews

A Manual of Clinical Laboratory Methods. By Clyde Lottridge Cummer, Ph.D., M.D. Illustrated. Lea & Febiger, Philadelphia, 1922.

The author of this contribution to medical literature is the Assistant Professor of Clinical Pathology in Western Reserve University. He tells us that he has prepared it for the use of students and practitioners in order that they might have before them clinical laboratory methods in a concise and accessible form. Accordingly, the plan adopted has been, first, to outline routine examinations, and secondly, to give a description of the simpler qualitative measures which are frequently employed, then quantitative methods of those which have an intricate technique, and finally the discussion of the findings of various morbid conditions. Special attention is given to methods commonly employed in clinical work, as, for example, the counting of blood cells. A fairly copious bibliography of the papers which the author considers of particular importance is placed at the end of the volume. There are 136 engravings and 8 colored plates. Most of the engravings deal with apparatus. The reader will also find adequate and complete descriptions of the various methods which are employed in gastric and duodenal tests. The closing portion of the book contains an appendix in which advice is given as to the care of a large number of urinary specimens in a hospital laboratory. This fact is mentioned because it emphasizes the practical character of the volume.

A Manual of Diseases of the Eye. For Students and General Practitioners. By Charles H. May, M.D. Tenth edition revised, copiously illustrated. William Wood & Company, New York, 1922. Price $3.50.

This is the one small book upon diseases of the eye which has deservedly reached greatest popularity. Including the index, it is confined to 440 comparatively small pages, and yet it deals with its subject so well that the publishers tell us that it is used in 90 per cent of the medical schools and that several editions have been published in French, German, Italian, Dutch, Spanish, Japanese, and Chinese languages. The colored plates, of which there are 22, are as a rule very good, and in addition there are 71 colored pictures. When we remind the reader that there are 377 original illustrations in a book of 440 pages, some conception of the freedom of illustration can be gathered.

Long experience as a practical clinical ophthalmologist has equipped Dr. May thoroughly not only for the original text but for the various corrections which each edition has required. For a book on ophthalmology to have reached ten editions since August, 1900, is certainly a tribute to its practical value.

The Writing of Medical Papers. By Maude H. Mellish. W. B. Saunders Company, Philadelphia, 1922. Price $1.50.

The author of this little brochure of 157 pages, including the index, is the editor of the Mayo Clinic publications. How many medical authors will choose to consult her text is a question, but it goes without saying that if they do their contributions to medical literature will be better than if they do not.

In one place she gives a considerable number of "Don'ts" to would-be authors, some of which we think few writers would be guilty of needing to heed. Other "don'ts," however, might be absorbed by almost every one with advantage.

At the close there is given a list of standard abbreviations for medical journals, which we presume is identical with that employed by the catalogue of the Surgeon-General's Office in Washington.